THE FARMERS' REGISTER.

VOL. VI. JUNE 1, 1838. No. 3.

EDMUND RUFFIN, EDITOR AND PROPRIETOR.

THE ADVANTAGE OF OBTAINING SEED WHEAT FROM COLDER REGIONS. BENEFIT OF MARL AND GYPSUM ON SWEET POTATOES.

To the Editor of the Farmers' Register.

Berkeley, Charles City, April 5th, 1838.

I have thought some facts, resulting from my experience as a cultivator of the earth, might be acceptable to you, and therefore take the liberty of communicating them. The first in importance, is the success which I have uniformly met with in the culture of wheat, when good seed was procured from the north, or the mountains of this state. When the Lawler wheat was much approved in the county of Frederick, although never *very* productive, I procured two bushels, which were sown late in the season, and on a very poor piece of ground---all of my good land having been previously sown. The produce of the Lawler, however, was 43 bushels of as beautiful wheat as I ever saw. This was used as seed, and produced a crop of about 800 bushels, weighing 64 lbs. 12 oz. per bushel, as reported by my friend Mr. Nat. Nelson, who kindly delivered it for me during my absence from home. The 3d crop from the same seed was an indifferent one; and the 4th utterly worthless---having been destroyed by rust. A year or two afterwards, I obtained from the same county of Frederick, a white plump wheat, known there as the "skip-back;" 5 bushels of this were sown on as many acres of good land, being the lot below my garden. Its yield was 35 bushels per acre. The subsequent crop, from this as seed, was an immense one. I cannot determine exactly its amount, but it was nearly all of a crop of 3600 bushels. The third crop from the same wheat was an average one, but the 4th disappointed my expectations. I have obtained other seed since, and the results correspond with this statement, that northern or western seed, when good, was to be relied on with confidence for two seasons; afterwards, I think it rapidly deteriorates.

The first Baltimore or golden-chaff wheat I ever saw, brought into this neighborhood by Williams Carter, Esq., consisted of one quart obtained in Pennsylvania; the produce of which was, according to my recollection, not less than three bushels. This, for several years, was preferred to all other wheats, as decidedly the most productive. The same gentleman was the first in this county to cultivate the purple straw; and for two or three years with great success. I am satisfied, from these facts, and others within my knowledge, that our crops of wheat would be much more certain if we were to rely on the north or west for as much seed wheat of which the second year's produce would furnish a sufficiency of seed for a full crop. For instance, I have never made less than 20 bushels per acre from such seed the first year, and generally quite as much the second. Every farmer may determine for himself what quantity is therefore necessary to obtain in the first instance, to furnish himself with a sufficiency of seed for a crop.

Another fact which I deem worthy of record is, my success last year in the sweet potato crop. I have for many years attempted sweet potatoes, to oblige my little ones, but there was really no crop, a few scurvy roots were all we could boast; and having no idea of the product, I directed, in the absence of my family, 20 hills to be dug in October for my own use. I chanced to be present when the digging commenced, and really was astonished at the yield; the first hill producing one peck, the largest of which weighed 5 pounds; and I have no doubt the product, although not measured, was not less than 200 or 300 bushels per acre. This excellent crop was owing entirely to an abundant use of marl and plaster of Paris, and certainly yielded the best and largest potatoes I ever saw; many, very many of them, weighing from 5 to 7 lbs. each. The soil in which they grew was quite light, and inclining to sandy. The seed was procured from Mr. Isaac White of Richmond. Very respectfully, &c.

BENJ. HARRISON.

[The opinions expressed in the foregoing communication, are altogether in opposition to the theory of Dr. Bronn, which we published in the first volume of this work, and to which we have several times referred with approbation. The rules deducible from that theory would require, that crops cultivated and mostly valued for their seeds, (as all grain crops,) are improved, or preserved in greatest perfection, by being raised from seeds grown in warmer climates, or on warmer and drier soils; while crops valued not for the quantity of seed, but for the whole bulk of the plants, in stalk and leaf, (as grass crops) are improved in bulk, though at the expense of the quantity or perfect formation of the seed, by being raised from seeds brought from colder and moister climates, or soils. From the confidence we had placed in these views, we should have considered Mr. Harrison as mistaken, if he had merely judged the product of the new wheats to be the greatest by the visible superior growth of the stalks, or greater bulk of straw; which might well be the case (according to Dr. Bronn's theory,) though accompanied by a reduction in the quantity of grain. But the products were ascertained, in these cases, by actual measurement; and there can be no higher authority for facts, or correct deductions from known facts, than our correspondent; and theoretical reasoning, however plausible, must yield to facts, correctly understood. At any rate, the information is interesting, and the results well worthy of being tested by the equally careful experiments of other farmers.]

PHOSPHORESCENT PLANTS.

M. De St. Hilaire says that the *agaricus (l'olivier)* gives out a yellowish phosphorescent light in the dark; and it is supposed by M. Vallot that the notices of phosphorescent plants in ancient

writers refer to that of the agaricus. There are, however, flowering plants which also emit phosphorescent light; such as the *Euphorbia phosphorea L.*, the milky juice of which possesses this quality. *(L'Echo du Monde Savant.)*

For the Farmers' Register.

PERPETUAL FERTILITY OF CERTAIN SOILS.

The following extract is taken from an interesting and scientific work, entitled "Travels through the Western Country, in the summer of 1816, by David Thomas."

"The fertility of the sandy prairies near the [Wabash] river is very remarkable. If lime is a constituent of this soil, the portion must be inconsiderable, as acids produce no effervescence. Neither is the vegetable matter in much quantity. The finer parts diminish but little in the fire, and are changed from a black to a reddish-brown. Hence the fertilizing principle is a mineral earth.

"The idea of soils *perpetually fertile* was not original with H. Davy, though to him we owe the first scientific view of the subject. Vegetable matter soon dissipates; but the primitive earths are imperishable; and if my conjecture is correct, these prairies will be sources of abundance through distant ages. A field was pointed out to me, which had recently been enclosed from the commons of Vincennes, and which produced corn of extraordinary luxuriance. From the nakedness of this ground it is evident, that a vegetable soil would soon become steril.

"One of my correspondents remarks, 'we have a prairie below this place, which has been in cultivation for seventy or eighty years, and now produces well.'

"Lord Kaims mentions a field near the Clyde, in Scotland, which had annually produced a crop for 101 years, and still retained its fertility. The subjoined extract is from the 'Edinburgh Encyclopædia.' 'The lands of St. Iago, (Chili) though constantly cultivated for two centuries and a half, without receiving any artificial manure, have suffered no diminution in their amazing produce.'

"Some of the great bottom of the Mississippi, between Kaskaskia and Illinois 'has been in cultivation 120 years, and still no deterioration has yet manifested itself.'"

I have made the above quotation for the purpose of adducing a few instances of almost equal fertility, presented by some of the soils of Eastern Virginia, apparently of very diverse constitutions. In none of them, as far as I am aware, has any portion of lime been detected. That the presence of lime gives fertility and durability to soils is fully demonstrated by all practical and scientific writers on agriculture; but that equal durability should characterize other soils, of which lime [in its usual state of *carbonate*] forms no constituent portion, can only be accounted for on the supposition of the existence of neutral soils, as promulgated by the author of the "Essay on Calcareous Manures."

There is probably no soil in Eastern Virginia, nor indeed in any part of the state, which is superior to the best of the ferruginous lands in the vicinity of Beaverdam, Goochland. It is an aluminous mould, in which the clay forms so great a proportion, that in times of rain it is as adhesive as mortar; though in a dry state, the surface is light and puffy. It is so red, that the line between the soil and subsoil is not always obvious. The neighborhood was settled about the year 1712; consequently much of the land has been in cultivation upwards of a century. When it is considered that the system of agriculture, which has prevailed, has been one of continual cropping—that heavy drafts have been yearly made upon the soil without its having received any aid from ameliorating crops, or artificial manures—and when it is moreover known that these lands remain to this day highly productive, it must be admitted that they merit the title of being almost "perpetually fertile." The farm of the late Geo. Pleasants may be cited to illustrate the truth of what I have stated. In the worst seasons, it never fails to produce a fair crop; and in years of plenty, it is now capable of yielding twenty bushels of wheat to the acre. Under an improved system, and possessing, as has been evidenced by the effects of one or two partial crops of clover, the greatest recuperative powers, it is expected that the present proprietor, who has inherited this valuable patrimony, will soon advance its condition to that state of productiveness of which it is so susceptible.

There are some portions, however, of the Beaverdam lands, that are rendered almost steril by a superabundance of isinglass or micaceous earth. This ingredient not only destroys their adhesion, but prevents any permanent improvement from being effected, even by the most liberal use of manures. In twelve months, they become again as barren as they were at first.

A short distance above Richmond are to be seen some specimens of fine granite soils, on the boundaries of the bituminous coal field. On the farms of Thos. M. Randolph and John Wickham, near Tuckahoe creek, where the granite rock, which forms the bed of the coal measures, appears in large quantities, the soil is much more fertile and durable than it is either to the east or west of the granite line. Many years' cultivation, under the usual system, has not impaired its original freshness and vigor. I can only ascribe its superiority over the contiguous cold and heavy lands, to the gradual addition of granite by disintegration; thus constituting a soil in which silicious matter was originally deficient. How far this modification of its texture has been beneficial in other portions of the same range, I have not had the means of judging.

The granite soils which constitute the dividing line between the tertiary and secondary formations of the state, have been represented, and very truly, as being exceedingly barren. If there be no exception to their general character in Virginia, there is, however, a most conspicuous one in the neighboring state of Maryland. The tract of country known by the name of *Elk Ridge*, on the Patapsco river near Baltimore, and which exhibits a soil composed in a great measure of disintegrated granite, is the admiration of all travellers who have seen it. There is perhaps no district east of the mountains which possesses greater natural fertility; nor is there any, where the effects of judicious cultivation are more agreeably exemplified. In approaching tide-water, the character of the soil undergoes a gradual change in

proportion to the quantity of decomposed granite.

The low grounds lying on the margin of James River, which are too well known to require any description, may be adduced as an instance of the extreme durability of soils, scarcely less imperishable than the black prairies of Indiana. Though they now exhibit the benefits of good culture in a remarkable degree, even under the severe pressure of the four-shift system; yet the most exhausting tillage to which they were formerly subjected, had effected but little deterioration in their fertility; and indeed some portions of them have never been sufficiently reduced by a long course of corn and tobacco, to yield a crop of wheat that will not lodge before harvest. Their extraordinary productiveness is no doubt chiefly to be ascribed to their alluvial formation, combined with the accumulation of mineral earths which they have received from the mountains through a long course of ages.

The whole of these flats is believed to be now under culture for a considerable distance above Richmond. If there be any remains of the original forest, it is not within my knowledge; but I have a distinct recollection of some portions of it, before it had been despoiled of its glory. Such sylvan magnificence is perhaps no where to be seen in Eastern Virginia at this day; and even the bottoms of the Missouri have seldom exhibited specimens of more towering height and gigantic proportions.

T. S. P.

From Blackwood's "World we Live in."

RAILROADS AND STEAMBOATS.

It might be a serious speculation to inquire into the probable effects of the railroad system on mankind. Certainly no system ever became so popular, and so suddenly and so widely popular. France has begun to fling out those gigantic arms of communication over her noble country. Belgium exults in the commencement of a web of railroad in which it expects to catch all the stray dollars and centimes of the continent. The transit from Ostend to the Rhine will, in the course of a year or two, be an affair of a couple hours. Germany is shaking off the sleep, her blacksmiths are lighting their Hercynian forges, and from the mountains of the Hartz to the Tyrol, huge men with antediluvian visages and Cyclopean arms are hammering at iron wedges, rail, and gear, for "fire horses." Prussia is laying down railroads from her capital to France, to Poland, and to Austria. The puzzling question of her politicians being, whether she thus invites invasion, or proposes defence. But politicians are blockheads on matters of common sense, and of all blockheads the German politician is the most profound, headstrong and hopeless. The merchant, the traveller, and the tinker know better things. They could tell them, that the roughest of royal roughriders, was never able to whip and spur either Frenchman, Belgian, Prussian, or Austrian into belligerency, more than fifty years out of every hundred. But, thanks to the growing common sense of mankind, they never will be able to do this again, now that the world are beginning to discover that fifty years of victory are not worth one year of peace. In short, the world is evidently become a buying and selling world, a vast spinning and weaving community, a vast aggregate of hands and heads, busy about the main chance, and much more inclined to eat, drink, and be happy, than to burn each other's warehouses, or blow out each other's brains. That war will never cease out of the world, is a theorem founded on the fact, that the countless majority of mankind have a strong tendency to be fools; but we may establish another theorem, that the more difficult it is to make war, the less likely it is to be made. The more mechanical dexterity, personal ingenuity, and natural expense that is required to make war, the more will success be out of the power of brute force, and the more in the power of intellectual superiority.

Let war come to a conflict of steam engines and all the barbarian rabble of the world, Turks and Tartars, Arabs and Indians, Africans and Chinese, must obviously be out of the question at once. They may massacre each other, but they must fly from the master of the mechanics. All the half barbarians, Russian, Greek, Pole, Swede and Austrian, must make the attempt only to be shattered, and Field Marshal Stephenson, with his squadron of fire horses, galloping at a rate of eighty miles an hour, must consume their battalia with the breath of his nostrils. Thus England, instead of feeling alarmed at the sudden passion of foreigners for mechanicism, should rejoice to see the passion spreading, should encourage them to throw all their powers into mechanical rivalry, and exult in every railroad that shoots its serpent line among the hills and valleys of the continent, and hail the smoke of every steam engine that trails its murky line along the sky, as not merely an emblem, but an instrument of their own superiority. Mechanicism, the great power of art, is as exhaustless as any of the great powers of nature, for it is only the exhaustless vigor of intellect combining with and commanding the secrets of nature.

Ten thousand years might roll on, and every year see a new advance of every kingdom of Europe in invention, and England keeping ahead of them all, and like one of her own engines, showing her speed by the sparks that lighten the road behind. The steam engine in its effective state, is but little more than half a century old, for its invention, in the time of Charles II., left it upwards of a century, little more than a toy. In half a century more, its present perfection may be looked upon as little else than that of an ingenious plaything. It is scarcely ten years since the steamboat first ventured to sea. Thirty years ago, the late Lord Stanhope, was laughed at by all London, for his attempt to swim the steamboat from London Bridge to Greenwich. It now dashes from the tower to Constantinople; or shoots down the Red Sea, fights the moonshine on its own ground; sweeps to Bombay, Ceylon, and Bengal, and astonishes the Mogul and the Emperor of China, the same morning, with the month's newspapers from London. The railway, in its present power, is not ten years old, yet is already spreading, not merely over Europe, but over the vast savannahs of the New World. What will all this come to in the next fifty years. What must be the effect of this gigantic stride over the ways of this world? What the mighty influence of that mighty communication which, even in its feeblest state, has been in every age, the grand instrument of civilization?

Throw down the smallest barrier to become more civilized. Open the close shut coast of China or Japan to mankind, and from that hour the condition of the people will be in progress of improvement. The barbarian and the despot hate the stranger. Yet for the fullest civilization, freedom, and enjoyment of which earth is capable, the one thing needful is the fullest intercourse of nation with nation, and of man with man.

The European passion for the railroad is certainly one of the most singular, as it is one of the most cheering characteristics of the age. Like all instruments of national power, it may be made an instrument of evil. It may give additional strength to the tyrannical, and accumulate force against the weak, pour resistless invasion against the unprepared, and smite the helpless with unexampled rapidity of ruin. But its faculties are made for peace, its tendency is to make nations feel the value of peace; and unless some other magnificent intention shall come to supersede its use, and obliterate the memory of its services, we cannot suffer ourselves to doubt that the whole system which is now in the course of adoption, with such ardor throughout Europe, will yet be acknowledged as having given the mightiest propulsion to the general improvement of mankind.

From the London Mechanics' Magazine.

EAST INDIA CAOUTCHOUC.

It is well known that a large supply of this valuable substance might be procured from India, if the same care were to be taken in gathering it as in South America. "The London Caoutchouc Company," impressed with this idea, accordingly sent to India an offer of a premium of fifty pounds for the first hundred weight of East India caoutchouc which should be shipped for England. When the offer arrived, however, it was somewhat of the latest, the great demand existing at home for the article had been previously heard of, and large quantities were already on shipboard; compared to which the "hundred weight" stipulated for was but a molehill to a mountain! The whole affair forms an apt illustration of the doctrine that, in commerce, the force of self-interest is far superior to that of artificial bounties.

ORIGIN OF COAL.

Coal is supposed by some writers to be the remains of antediluvian timber which floated in the waters of the deluge until several mineral strata had been formed; others conceive it to be antediluvian peat bog. It was used in England anterior to the reign of Henry III; for that monarch, in 1234, renewed a charter granted by his father to the inhabitants of Newcastle, by which they were permitted to dig coal on the payment of £100 per annum. Coals had been introduced into London before 1306, for in that year the use of them as fuel had been prohibited, from the supposed tendency of their smoke to corrupt the air. About the beginning of the sixteenth century the best coals were sold in London at the rate of 4*s.* 1*d.* per chaldron, and at Newcastle no more than 2*s.* 6*d.* for the same. During the ensuing century, however, they were received into such general use, that in 1648, on the scarcity of coal in London, many of the poor were said to have died from the want of fuel. The whole quantity of coal sent into London on an average of four years, has been estimated at 1,170,000 chaldrons per annum. There has been much dispute on the origin of coal, but Brogniart has given the following as the general conclusions of naturalists:—1. That coal was formed at the same time as, or after the existence of, organized bodies. 2. That this mineral when first formed was liquid, and in a great degree of purity. 3. That the same cause which produces this substance is several times renewed in the same places and under the same circumstances. 4. That the cause, whatever it may be, is nearly the same over all the earth, since the beds of coal always exhibit nearly the same phenomena in their structure and accidental circumstances. 5. That these beds have not been deposited by any violent revolution, but, on the contrary, in the most tranquil manner; since the organized bodies that are found in them are often found entire, and the leaves of vegetables impressed in the slate which covers the coals are hardly ever bruised or otherwise deranged.—*Merthyr Chronicle.*

From the proceedings of the seventh meeting of the British Association, for the advancement of Science.

REMARKABLE CLEARNESS OF THE AIR A PRECURSOR OF RAIN.

Professor Lloyd said that the distinctness and vividness with which distant objects were seen in some states of the atmosphere was quite astonishing: on one occasion he had seen from the neighborhood of Dublin the Welsh hills from their very bases, and brought so near, apparently, that he could absolutely see the larger inequalities of the surface upon sides of the mountains. That the atmosphere was at the time very much loaded with vapor in a highly transparent state, was obvious from the fact, that immediately after a very heavy fall of rain took place, and continued for a considerable time. Professor Stevelly wished to confirm what had fallen from Professor Lloyd and M. de la Rive by stating that whenever the Scotch hills appeared with peculiar vividness and distinctness, from the Lough of Belfast, the fishermen always looked upon it as a sure precursor of heavy rain and wind. A friend had informed him that on one occasion he had noticed this appearance while standing on the beach at Hollywood, and pointed it out to an old fisherman; the old man immediately gave notice to all his friends to whom he had access, who instantly set about drawing up their boats and placing their small craft in more secure places; early the next morning a violent storm came on, which did much damage upon the coast, to those who had not been similarly forewarned. It might, perhaps, be accounted for by supposing that on these occasions the intervening air became actually converted into a large magnifying lens.

From the same.

BEER.

Mr. Black communicated a paper "On the influence of Electricity on the processes of Brewing." According to his statements a thunderstorm not only checks the fermentation of worts, but even raises the gravity of the saccharine fluid,

and developes in it an acid. This effect is witnessed principally when the fermenting tun is sunk in moist earth, and may be obviated by placing it upon baked wooden bearers, resting upon dry bricks or wooden piers, so as to effect its insulation. Mr. Black also stated, that during the prevalence of highly electrified clouds, the fabrication of cast iron does not succeed so well as in other states of the atmosphere.

From the Quarterly Journal of Agriculture.

ENAMELLED HARDWARE.

This admirable substance is of German invention, and has only of late years been introduced into the southern part of this country, where it is still but partially known. The art of enamelling on iron, *it is said*, cannot be accomplished by our manufacturers; and we are in a degree disposed to give credence to the assertion; for we know two instances in which potters have given their opinions of the impracticability of its accomplishment. During a visit to London three or four years since, our attention was attracted by some iron saucepans and frying pans, as we passed the shop of an ironmonger at the corner of the Old Bailey, on Ludgate Hill, which appeared as if they were lined with white paper, instead of being tinned in the usual way. On investigation, we found them to be enamelled; and, by inquiry, learnt the following particulars:—That they are imported, a ship-load at a time, from Germany; that the manufacture is unknown in England; that they are durable, and not liable to injure.

We immediately purchased one; and, subsequently, several others of different sizes, as well as a frying pan, and are *entirely satisfied with them all.* We will enumerate their advantages, and our readers will thus judge for themselves, whether or not our panegyric is too highly colored, when we pronounce them to be the *ne plus ultra* of cooking utensils,—without a fault! They are kept clean with the least possible trouble; they never crack or craze, and they perfectly retain the color and the flavor of every product of the culinary art; so many sad accidents have resulted, and are still occurring, from the use of copper saucepans, stew-pans, &c., that it becomes a duty, with every writer of influence, to dissuade the public from the use of them, by urging the deleterious nature of copper on their attention. To our readers, we are well aware, this information will be superfluous; but they must know, as well as ourselves, that errors remain unrectified,—abuses exist unabated—faults rest unreproved—dangers lurk and threaten uncared for, until our natural supineness is roused by an actual evil overtaking us, which might and ought to have been prevented from existing. When too late to avert a calamity, we wonder at our apathy, and bewail our culpable remissness. Gentlemen are out of the sphere of copper stew-pans, and provided they find their dinners well appointed, care nought for the kind of metal in which they are cooked; domestic matters being very properly consigned to the lady of the establishment. But it unfortunately happens, that ladies dislike to interfere, and rely upon the sagacity of their housekeepers, who also depend upon the cleanliness of their subordinate kitchen-maids; and thus may the lives of a whole household be periled by the ignorance or idleness of this denizen of the scullery, as yet unvisited by "divine philosophy." We can well imagine, that on reaching this period of our subject, some "lord of a wide domain" looking off from his "Quarterly Journal," will address his lady with this startling question, "Are there any copper stew-pans or sauce-pans in the kitchens, my love?" To which she will, with unfeigned surprise, reply, "Really, my dear, I not know, but I dare say Harris can inform you;" and the affair of poison in a ragôut being momentous, the housekeeper would be summoned, and be in turn astonished with a similar query. Her reply of "Yes, at least a dozen," would complete the incipient dismay; and an order to have the dangerous utensils abolished, with the reason assigned, would infallibly elicit a decided assurance on the part of the confidential servant, that "all stews *must* be made in copper, for iron, tinned, would impart a flavor; that preserves and pickles *must* be boiled in copper, because they would lose all color, and not be fit to be placed on table, if iron was to be substituted."

This imperative "*must*" would, alas! in too many cases, decide the matter, and that vile pernicious copper still bear sway in the kitchens. In these admirable German stew-pans, however, we have a succedaneum of unquestionable capabilities, to supersede the necessity of pleasing our eye at the risk of our lives. Every species of cooking has been performed in our own utensils for several years, and to far greater perfection than we ever experienced, previously to the introduction of the enamelled hardware. Independently of its salubrity, we should give it the preference over every other; for, in consequence of the delicate and innocent nature of the glaze, which resembles that of china, all color and flavor are preserved in their utmost purity; and all housewives are aware, that these are desiderata in pickling and preserving.

We have stated that this ware is not liable to injure; but we ought to have placed this essential advantage in much more forcible language. The union of the enamel with the iron is so intimate, they are so entirely amalgamated, that it is utterly impossible to effect a separation; and we have known, that in the attempt several iron tools have been broken.

If we knew of a fault in them we would gladly name it, not only as a guide to ourselves in our future purchases, but because our readers would, perhaps, trust rather to qualified than unqualified praise. The only drawback which we ever found, was in their weight, which was greater than those made in England of the same size, and perhaps a dissightliness in the forms compared with those of our own manufacture; but both of these trifling objections have recently been removed. We confess that we had migivings when we made up our mind to order a frying-pan, that the enamel would not endure the very great heat to which that kind of cooking necessarily subjects the vehicle in which it is performed; but we are gratified in being able to assert, that we have had one in frequent use for some months past, and it is as white and uninjured as when we received it first.

We should rejoice to hear that our manufacturers intend to give their attention to this useful and beautiful art; and what can they not achieve with that industry, perseverance, science, wealth, and emulation, for which they are, above those of all other nations, celebrated?

From the Gardeners' Magazine.

CONJECTURES RESPECTING THE CAUSES WHICH PRODUCE DOUBLE FLOWERS IN PLANTS; TOGETHER WITH THE RESULTS OF SOME EXPERIMENTS MADE WITH A VIEW TO THE SAME OBJECT.

By James Munro, Forester to the Marquess of Northampton, at Castle Ashby, Northamptonshire.

Of the various phenomena which nature exhibits in her economy of the vegetable kingdom, the cause which produces double flowers, and other singular varieties of plants, is, perhaps, least understood by horticulturists. Different reasons have been assigned for the presence of this *lusus naturæ* among vegetables; but, when even these theories have been subjected to a practical test, disappointment has followed.

The prevailing opinion, in earlier times, rested on the theory of contact; in other words, that double-flowering plants were a result from single and double plants of the same kind growing near to each other; an erroneous assumption, that double flowers possess impregnative qualities. Any person, possessing the slightest knowledge of the sexual system of plants, knows that double flowers are destitute of the productive organs; consequently, no seed can be obtained from plants of this description: they are anti-natural, and are occasioned by some infringement of the laws which regulate the vegetable economy. How, then, is it possible that plants thus physically incapacitated for self-reproduction, by seminal process, can influence the character of their neighbors by the mere circumstance of proximity? Besides, the unalterable relation of the order of cause and effect is fatal to this theory; for, if the agency of double flowers is required to alter the quality of single-flowering plants of any kind, the question arises, By what means did such flowers come to exist at first?

Of late years, it has been stated that Dr. Graham of Edinburgh gave it as his opinion, that, in order to have double stocks, it is only necessary to sow and rear the plants upon an exceedingly rich soil, such as the pulverised material of old hotbeds, &c. By this mode of treatment, I suppose it is presumed that the plants shall receive such a surfeit of alimentary matter as will cause a departure from the natural way by which their various organs are formed, and their functions regulated. The high authority whence this theory was said to emanate secured it from me a fair trial; but the experiment failed completely. My after experience points out a cause of treatment the opposite to that of Dr. Graham. I have found that, the more plants intended to save seed from are checked in their luxuriance, the greater is the chance of success. Every florist must have observed that all the stunted-growing kinds of annual stock are more productive of double flowers than are the rambling-growing sorts; and that, in both cases, the proportion of doubles is greater from seed that is saved in an exceedingly dry season, when the growth is less luxuriant. From this and other circumstances which have come under my notice, I think there are grounds for questioning whether the agency of any of the afore-mentioned theories is in the remotest degree connected with the producing of double blossoms.

The longer I consider this subject, the less I feel disposed to trust in the efficacy either of the theory of contact or of alimentary surfeit; the true cause, I think, is more likely to be detected by properly tracing that striking analogy which subsists between vegetable and animal creation. This analogy is stronger than is generally supposed; and, therefore, if we would arrive at correct conclusions regarding vegetable physiology, we would do well to keep constantly in view the relative position which the subjects under consideration may occupy in the scale of creation. Plants are dependent on air and nutriment as well as animals: they are furnished with numerous organs, suited almost to an animated existence; these are skin, pores, glands, hairs, bristles, flesh, or fibre: they have organs for respiration, with veins and arteries, and a circulating fluid traverses the whole. This fluid is at times held in excess by some trees; when bleeding, or an operation equivalent thereto, may be practised with propriety. Ringing the bark of fruit trees, and shortening their roots to bring them into bearing, are here alluded to; by which process, if a copious discharge is not effected visibly, still a determination of sap to the head is prevented: this fluid adds annually to the bulk and strength of the vegetable structure; which, as with animals, the better it is fed, the better it flourishes. Nor does the analogy stop here: mutilations may be healed or replaced; wounds and bruises may be cured by applications similar to those remedies resorted to in cases of fractures of the animal frame. Cancerous substances and tumorous excrescences may be excavated from trees as from animals; and counter-irritations are successfully employed by gardeners, many of whom well know the advantage of this process on trees technically termed hide-bound. Slitting open the bark, in such cases, produces effects on trees similar to that of the blister on animals. It has likewise been affirmed that excrementitious matter is emitted from the roots; and scrofulous-looking tumors, on some trees at least, are common.

If due consideration be allowed to all these close resemblances which the vegetable creation bears to the animal, I trust I shall not be thought extravagant in my ideas, if I endeavor to account for the phenomena of vegetable variation by tracing that analogy a step farther, and assign to plants, as in animals, a plurality of fluidal systems. In animals, the different fluids and humors originate in one common source, the blood; in plants, each system seems to have a direct communication with the elements, and in their operations are independent of each other. It is evident, from the manner in which its operations are conducted, that there is one grand system employed in forming the bark, leaves, and woody fibre; viz., the albuminous current: it is also apparent that a separate system exists in plants for the perfecting of the fruit, which may be denominated the seminal fluid; and it is highly probable that these systems are of a compound nature, each, perhaps, furnished with organs for producing the properties of color, taste, and smell, peculiar to each division. If the progress of vegetation is watched closely, we find that every tree, according to its kind, if raised in the natural way (that is, from the seed), has its whole powers directed to the accumulation of wood, bark, and leaves, for a series

of years. Twelve years commonly elapse before the fruit-buds appear on the apple. In form and size, these buds differ so widely in appearance from the buds which produce the annual spray, that the most partial observer must conclude that they cannot be the work of one and the same agent: if it were so, the fruit-buds, of course, would be contemporary with those that produce wood; this is sometimes the case with grafted trees, but never with such as are raised from the seed. If one universal system of fluid in plants (a servant of all-work) is contended for, viz. the albuminous current, how are we to account for its extremely eccentric nature? To suppose that it possesses the faculty of communicating color, taste, and smell to the wood, bark, and leaves, of a peculiar description, whilst it supplies the flower and fruit with these properties of a totally different description, is preposterous. In its journey through the leaves, the alburnous fluid must, doubtless, all undergo the same process of elaboration; consequently, must possess a unity of character: the whole mass must be applicable to one purpose only, either for the creation of bark, wood and leaves, or of flowers and fruit. It cannot be credited, that the same agent that gives to the capsicum stem and leaves the green color and insipid taste, is capable of communicating the inveterate acrimony of taste to the seed, and high color to the capsule. For my own part, I can see no way of overcoming the difficulty of accounting for the difference of color, taste, and smell, held respectively by what I shall here designate as the two grand divisions of the vegetable structure, except a plurality of fluidal systems be admitted. In short, the fact that these properties can be affected by the manner in which a plant is treated, is conclusive: color, in particular, may be altered by treatment, without interfering with any of the other properties; a fact clearly demonstrative of the independent action of the different systems.

There are many other facts which might be brought to bear upon this interesting subject; and I may particularise the dahlia as constituting a lucid example. Strictly speaking, the dahlia is not a double-flowering plant; still, I affirm that no plant ever introduced into our British gardens has been so rapidly improved. Great are the changes that have been effected in the color, size, and form of its flowers; still the stem and leaves have kept a uniform similarity, differing but little in appearance since the day of its introduction; a fact clearly proving that one of the grand divisions of the fluidal systems in plants may be affected by foreign influence, without detriment to the others. The improved condition of the dahlia, in regard to its flowers, I do not consider to be a consequence either of contact or of alimentary surfeit; but that it owes its origin to treatment in accordance with the theory herein contended for. Competitors at dahlia exhibitions, from observation, have learned the propriety of preventing an excessive bloom on their best sorts, seldom permitting more than three or four of the flowers to expand. By this means the sphere of the seminal fluid is curtailed, and the excess thus produced, acting upon a concentrated field of operation, undoubtedly causes the departure of the progeny from the habit of the parent: whereas, if the whole of the flowers which appear upon a plant were permitted to expand successively, the seminal fluid would then be equally distributed, in such proportion to each seed as would accomplish the intentions of nature; namely, consentient reproduction. The following experiment, performed by me some years since, is so strongly corroborative of what is here advanced, that I cannot resist giving it in brief detail.

At that period, I had a quantity of single scarlet ten-week stocks. Impressed with the belief that my theory was worth a trial, I selected a number of the plants; and, as soon as I observed five or six seed-pods fairly formed on the flower spike, every succeeding flower was pinched off. From the seed saved in this manner I had more than four hundred doubles on one small bed. Whether this success was in consequence of my mode of treatment, remains to be proved by future experiments; yet I cannot help thinking that it was; and that, if I had left fewer seed-pods on the spikes, the proportion of double plants would have been still greater.

In conclusion, I shall instance one or two more facts in favor of this theory, which are acted on almost every day: I allude to thinning of grapes, peaches, and other fruits; a process whereby the quality of fruit is much improved, while the woody part of the plant is not visibly affected. If the albuminous current were alike the source of woody fibre and fruit, any operation tending to produce immediate improvement on the one would, as a matter of course, be observable on the other: this, however, is not the case. Again, when a tree shows any decided determination to fruit bearing, little or no spray-wood is made; on the contrary, when an inclination to wood is exhibited, fruit is less plentiful: circumstances clearly proving that in vegetables there do exist two principles, and, to a certain extent, opposed to each other. It is in consequence of the contention of these principles, that practical men resort to ringing of the bark, shortening of the roots, &c., as remedies bearing the sanction of experience, for counteracting any ascendency which the one may have obtained over the other. I shall only add, that the experience which I have had of the working of this theory has determined me to resume my experiments on the first opportunity, the results of which shall be faithfully communicated.

Castle Ashby, Dec. 1837.

From the Franklin Farmer.

HARVESTING OF CORN.

To the Editor.—As the season is approaching in which the farmers will commence the securing the abundant crop of corn with which a bountiful Providence has blessed our country, it may be pertinent to the occasion to offer a few remarks upon the best mode of harvesting the crop.

Our Virginia ancestors and those who think it wise to plant and cultivate and gather as our fathers have done, pursue the old method; about this time they gather the blades below the ears of corn—after they consider the corn to be ripe, they top the stalks and secure all of the fodder in stacks for winter use. In November they pull the corn and remove it to cribs, where it is husked out at leisure. This mode is rapidly yielding in the

stock districts to that first introduced among the graziers on the south branch of the Potomac. The farmers in the northern and middle districts of Kentucky, and in the Scioto valley of Ohio, have generally adopted this latter mode; which is to cut the stalks, corn, fodder and all, and place them in shocks commonly embracing sixteen hills square.

I have seen the richest crops of many climates gathered, and there is no operation in husbandry so animating as that of cutting corn in the mode just mentioned. It is a most cheering prospect to see twenty acres of corn pass in one or two days to a condition in which it is prepared to keep in the field throughout the winter. This remark is predicated particularly upon the plan of riddling the squares, instead of cutting the whole square at once. It will readily occur to any observing mind, that as corn does not ripen with precise regularity, if the entire square is cut out at once, some of the corn will mould and sometimes even the fodder will be affected, if the cutting shall be followed by warm or wet weather. To avoid this contingency, some graziers commence with the process of riddling, that is, they select only such part of the sixteen hills square as may be ripe—go through the field in this way, and in ten days complete the cutting of the square. By this process several important advantages are obtained—the greatest amount of fodder is secured, consistantly with the paramount object of saving the corn, and a nucleus for the shock being formed by the first cutting in the square, the shock becomes settled and stands better during the winter. In the rich counties of Clarke and Bourbon, they sometimes cut half of the square on one side and then in ten days finish it. Whilst many graziers in Fayette, Lincoln and Shelby, prefer the process of riddling.

In the course of October and November, these shocks are shucked out, the corn placed in cribs and two of the shocks placed together, or one placed upon the ground and two others put around it.

It is the opinion of practical farmers, that the practice of cutting corn in this mode secures the greatest amount of corn and fodder with the least expense, and is decidedly an improvement on the old Virginia plan, more especially when applied to the feeding of cattle or mules. T.

From the Quarterly Journal of Agriculture.

ORGANIZATION AND FUNCTIONS OF ANIMALS AND VEGETABLES COMPARED.

It is a very important preliminary to the study for which I would gain the attention of practical men, that they understand the nature of plants; of those organic creatures whose diseases they would obviate; for an ignorance of, or an inattention to this, is one of the causes that so little progress has been made in this branch of natural philosophy. It is absolutely necessary and important for them to understand fully that this part of the creation, the very grass they trample upon, is so highly organized, so exhibiting intimations of the functions more highly developed in the superior animals, that it is not possible to point out where animal life terminates, and where vegetable life begins: the zoophyte connects the two kingdoms. It is absolutely necessary, I think, for this to be understood and felt by those who enter upon the investigation of vegetable diseases, because I have a strong opinion that these in many, very many instances, are caused by the plants which they infect being treated as if they were totally insensible, inorganic matters, scarcely more susceptible of injury at some periods of their growth than the soil from whence they partly derive their sustenance.

To determine the question whether plants possess a degree of sensation, is not so easy as many persons may believe. "It is as difficult," says Mr. Tupper, who has written ably upon the subject, "to ascertain the nature of vegetable existence, as to determine what constitutes the living principle in animals." Darwin, by the aid of imaginary beings similar to the Dryads and Harmadryads of the classic mythology, has raised plants to a position in the order of nature superior to that to which animals are entitled. Other philosophers, taking a totally antagonist opinion, estimate vegetables as bodies, only somewhat more organized than crystals, but like these entirely and exclusively subject to chemical and mechanical changes.

The above opinions are equally erroneous, as will appear from the facts arranged in the following pages. It might easily be made to appear that the gradation from reason to instinct, from instinct to inanimation, is as gradual as the transitions of light from the noon-tide to the midnight of a summer's day; but this essay must be confined to that section of creation that commences from the close of the animal classes in the zoophyte, and terminates where inorganic matter commences in the crystal; and its details must be specially directed to demonstrate how closely it approaches, how indistinctly it is divided from the former.

Let us first consider the comparative composition of animals and plants demonstrated by the researches of chemists. Their constituents are identical: carbon, hydrogen, oxygen, nitrogen, sulphur, phosphorus; acids, alkalies, earths, and metals, are the common components of both. Nitrogen has been considered by some chemists as the constituent, marking by its presence animal from vegetable matters, but the distinction fails in as much as that from some animal matters it is absent; whilst in the gluten of plants, a chief constituent of wheat, and in the whole frame of the tobacco, it is present.

If we follow the above chemical bodies through their combinations, we shall find that these in animals and plants are closely similar; and in both are equally numerous and intricate.

Of the acids there are contained in

Animals.	*Vegetables.*
1. Sulphuric,	1. Sulphuric,
2. Phosphoric,	2. Phosphoric,
3. Muriatic,	3. Muriatic,
4. Carbonic,	4. Carbonic,
5. Benzoic,	5. Benzoic,
6. Oxalic,	6. Oxalic,
7. Acetic,	7. Acetic,
8. Malic,	8. Malic,

and others equally numerous in each, but not common to both. Of the earths and alkalies, lime, magnesia, silica, soda, and potass, are found in each class. Of the metals, iron and manganese are their conjoint constituents.

If we follow the two classes through their more compound constituents, we will find the analogy still holds: they contain common sugar, mucus, jelly, coloring, and other principles, gluten,* fibrin, oils, resins, and extractives. The functions of animals and plants are similarly closely analogous.

Animals take in their food by the agency of the mouth, and prepare it for digestion by various degrees of mastication, or attrition, as in the gizzard of birds. In this they differ from plants, but these have this compensation, they imbibe their food in a liquid form, and consequently in a state of the finest possible division. Animal and vegetable remains are their common food, plants having this superiority over animals, that, as they only absorb the soluble and finer parts, they are not obliged to throw off the grosser constituents which appear in the excrement of animals.† In the animal stomach the food undergoes an extensive change, being reduced to a pulp of greater specific gravity, and being altered entirely both in taste and smell. In the lymphatics of plants, which may be considered their primary organ of digestion, their food, or lymph, undergoes a change precisely similar; its color and flavor are altered, and its specific gravity increased.

From the stomach, the animal's food passes into the intestines, is there subjected to the action of the bile, and converted into chyle, the nutritive part, and excrementitious matter. In their passage through the intestines, the chyle is absorbed by the lacteal vessels, and is conveyed into the blood; by the heart, the mingled fluids are propelled into the lungs, to be there exposed to the action of the air. The vital fluid there changes its purple hue for a florid red, loses a portion of its watery particles and carbon; the latter combining with the oxygen of the atmospheric air in the lungs, and being breathed forth in the form of carbonic acid gas. As plants in their food take in no gross, unnecessary ingredients, it is obvious that no process like the biliary operation of digestion is required. The lymph, or sap, proceeding at once along the branches, is poured into the leaves, the very lungs of plants. There, as in the blood, its color is changed, oxygen is emitted from it during the light hours of the day; but carbonic acid gas is thrown off during the night, and at all periods a considerable quantity of water.

From the lungs, by the agency of the heart, the blood is propelled through the arteries over the whole animal system, supplying nourishment and warmth to all the parts, and where, by these abstractions, it is again converted into purple or venous blood, it is returned by the veins to undergo the changes that were described as being effected by the lungs.

The sap, after exposure to the action of the air in the leaves, is returned by another set of vessels situated in the bark, ministering to the growth and support of the whole plant.

Such is the close assimilarity in the digestive and circulatory processes of the two classes; an assimilarity which obtains in all the other functions enjoyed by them in common. In respiration, the air inhaled through the mouth and nostrils proceeds immediately to the lungs and acts upon the blood; in plants, when it is inhaled by their leaves, it operates instantaneously upon the sap. The changes that take place have just been imperfectly noticed; but it is necessary to add, that the oxygen of the atmosphere, is the gas essential to the existence of animals; but it is its carbonic acid that is nearly as important to vegetables. They may be considered the vital airs of the two classes. If animals are placed in a situation where they inhale pure oxygen, their functions are highly and rapidly increased; but it is an exhilaration which would soon terminate in exhaustion and death, if breathed by them for any extended period. So plants will flourish in an atmosphere containing $\frac{1}{12}$th of carbonic acid, but if it much exceeds this proportion, they are rapidly destroyed. During sleep, animals expire less carbonic acid than during their waking hours; so plants emit little or no oxygen during the night.

After an animal has enjoyed the regular course of its functions for a period varying in its duration, the time at length arrives when decay commences. The wasted, enfeebled, and relaxed form gradually declines, until death finally closes all activity. The body then becomes contracted and rigid; the skin exchanges the ruddy tinge of health for death's pallid hue. Decomposition speedily ensues, with all its offensive phenomena; and finally the only permanent remains are the skeleton and a small amount of earthy matter. The same characteristics attend the last period of vegetable existence. Plants may flourish only for one season, or their lives may be extended through centuries of years, yet decay eventually comes over them; becoming more and more stunted, weak, pallid, and ragged, they eventually cease to live, become contracted and rigid, and pass through the same phases of putrefaction that are exhibited by the animal carcass. In both there was a time when warmth and exposure to the atmosphere were the sources of vigor, they now become the agents of destruction; they were once able to resist and to overcome the laws of chemical affinity, they now are destroyed by their attacks. What causes this most striking change? What antiseptic agent have they lost? There can be but one reply. It was their vitality. Now, let us examine how the vitality of plants in other respects resembles the vitality of animals, and I will confine this examination to two or three points.

Plants are *excitable*. Light acts upon them as a stimulus. Every body must have observed that plants bend towards the direction from whence its brightest influence proceeds. M. Bonnet, the French botanist, demonstrated this in some very satisfactory experiments, by which he showed that plants grown in a dark cellar, all extended themselves towards a small orifice admitting a few rays of light. Every flower almost has a particular degree of light requisite for its full expansion. The blossoms of the pea, and of other papilionaceous plants, spread out their wings in fine weather, to admit the solar rays, and again close them at the approach of night. Plants requiring a powerful stimulus, do not expand their flowers until noon, whilst some would be destroyed if compelled to open in the meridian sun,—the night-blooming *Cereus* unfolds its flowers only at night. Heat also acts as a stimulus upon plants.

* The gluten of plants is the albumen of animals.

† Is not the excretion from the roots of plants, as proved to exist by M. De Candolle, somewhat analogous to the excrementitious matter of animals?—EDITOR.

M. Duhamel observed, that during moderately fine weather the footstalk of a leaf of the sensitive plant *(mimosa pudica)* stood in the morning at an angle with the lower part of the stem of 100°; at noon the angle had increased to 112°, but at night had fallen to 90°. If a leaflet of this plant be but slightly touched, it immediately shrinks away; and the impulse being communicated, each pair of leaflets on the branch collapse in succession; and if the impulse be strong, the very branch itself will sink down by the side of the stem. If an insect alight upon the upper surface of the Venus's fly-trap, *(dionœamuscipula,)* its sides spasmodically approach each other, and crush to death the intruder. If the inner side, near the base, of any one of the anthers of the barberry, *(berberis vulgaris)* be gently touched, as with a bristle or feather, it instantly springs forward and strikes against the stigma. But the strongest indication, says Mr. Keith, of the existence of a species of sensitive principle in a plant, is, perhaps, that which is exhibited by the *hedysarum gyrans.* It is a native of India, growing on the banks of the Ganges. Its leaves are ternate, the middle leaflet being larger than the lateral ones. All of them are in constant vibratory motion; sometimes equably, at other times abruptly, but without any unison in the movements. If their motion be prevented, by grasping them in the hand, they renew it more vigorously when the confinement is removed, but by degrees subside to their natural rapidity of motion. This motion does not depend upon the application of any external stimulus, for it continues throughout the night as well as the day. It is most active during a warm fine day, the leaves then having an additional tremulous motion. *(Keith's System of Physiological Botany,* ii. 464.)

Instinct seems to be a characteristic of plants, from the following phenomena. Some of them close their flowers invariably when rain is approaching. Others have an unalterable direction assumed by them when climbing. No force can make one twist round a pole from left to right, if its natural direction be from right to left. If a garden pot be divided by a vertical partition, and one-half filled with a poor steril earth, and the other moiety filled with a rich fertile soil, a geranium or other plant placed in this pot, with some of its roots over the steril soil, and the rest of the roots over the fertile soil, those over the first named portion will gradually change their direction until they can also get into the richer pasturage. Instances have been known of the roots of trees piercing and destroying walls in their efforts to attain a more preferable soil than that in which they were planted. M. Saussure relates, that he placed some plants of *polygonum persicaria* and *bidens cannabina,* in water containing acetate of lime in solution. These plants then imbibed with the water a portion of this salt; but when they had the opportunity of selection given them, by dissolving in the water some common salt, glauber salt, and acetate of lime, they absorbed the two first named, but rejected the latter entirely. *(Saussure's Recherches,* 247-261.)

From the foregoing facts, without arguing that they demonstrate sensation to exist in plants as acute as that possessed by the higher or more perfect classes of animals, yet they certainly are satisfactory evidence that plants probably are nearly as sentient as the zoophyte, or even as the polypus and the hirudo,—animals that may be cut into pieces, and each section become a perfect individual,—animals whose heads may be taken off and grafted upon other bodies,—animals that may be turned with their outsides inwards, and yet without any apparent inconvenience. If plants be endowed with sensation of the most limited degree, it explains the cause, throws light upon the prevention of many diseases that affect those which are the object of cultivation, warns the tiller of the soils from the late performance of many of his operations, and teaches him generally to be less violent in his field practice. If a grape vine be pruned too late in the spring, the bleeding, or effusion of sap, has been known to be so violent, that the tree has died from absolute exhaustion. Stone fruits, if severely wounded, are frequently destroyed by the inroads of a disease resembling in all its characteristics the cancerous affections of animals; and I have known a whole crop of wheat affected with a swelling of the stem or culm, evidently caused by an extravasation of the sap from its ruptured internal vessels, owing to the roller being passed over the crop when of a growth somewhat too forward.

From the proceedings of the seventh meeting of the British Association, for the advancement of Science.

CATASTROPHE IN A MINE.

Mr. Sedgwick requested the attention of the meeting to an account, which he was about to submit, of the late unfortunate accident at the Workington Colleries. He pointed out, on the geological map, the rocks which occur in that neighborhood, and stated some of the phenomena of the stratification of the coal measures, which are there very much disturbed. There is an anticlinal line, on the opposite sides of which the strata dip differently, so that, in one place, very important beds of coal crop out under the sea. Workings, quite submarine, have accordingly been carried on for some time: in the Isabella pit, a depth of one hundred and thirty-five fathoms under high water has been reached. A culpable want of caution has been shown by the managers of late, as they have caused the workings to reach too near the sea—even within fourteen fathoms of it; and the pillars and roof of the older works had been taken away, by which the danger was greatly increased. There had been repeated warning from the shrinking of the ground, and from an old work having become filled with water; also in the new workings—although the pumping brought up one thousand gallons per minute, the miners were in such danger of being drowned, that several left the employment. In the latter end of July, the sea at length broke in, filling the mine in all its parts, in little more than two hours, and destroying twenty miles of railway. On one side of the Camperdown Dike, which ranges through the mine, not a soul was saved; but several escaped from other parts, and one individual, an Irishman, called Brennagh, had not only a remarkable escape himself, but saved three others by his intrepidity. Professor Sedgwick related to the Section this man's story, which was so singular and told with such a mixture of the serious and ludicrous—often in the language of the man

himself—that it is impossible to convey to the reader an idea of the effect produced on the audience. A remarkable fact in the escape of one of the individuals rescued by Brennagh was, that he was actually *blown up* the last open shaft of the mine by the enormous force of the air, the noise of which was heard at a considerable distance in the country. The first notice to Brennagh of the accident, was an unusual undulation of air in the galleries, which made him suspect that all was not right, and he took the precaution of moving near to an air passage in the dike, which he had been permitted to use: he was thus enabled to save himself and his companions. At the suggestion of the professor, a subscription was made in the Section for Brennagh, which amounted to £34.

From the same.

PLANTS GROWING UNDER GLASS.

In April last, Dr. Daubeny introduced into globular glass vessels, their aperture being covered with bladders, three several sets of plants. In the first were *sedum*, *lobelia*, *&c.*; in the second, *primula*, *alchemilla*, *&c.;* in the third, *armeria*, *sempervivum*, *&c.* At the end of ten days the plants were healthy, and had grown. The air in the jars was examined, when it was found that the first had four per cent. more oxygen than the atmosphere, the second also four per cent. more, and the third one per cent. more. This was the result of examination during the day, but at night the excess of oxygen had disappeared. On the eleventh day, the first jar contained two per cent., the second and third, one per cent. excess of oxygen. At night there was less oxygen than in the atmosphere. On the 20th of June, the following results were obtained: in the first jar, two and a half per cent., in the second jar, three and a quarter per cent., and in the third jar, four per cent. less oxygen than in atmospheric air. Some experiments were then made to determine the rate of success of air to the plants through the bladder, and it was found that when the jars were filled with oxygen, the average rate at which it escaped till the internal air was like that of the atmosphere, was eleven per cent. daily.

Professor Lindley then read a paper by Mr. Ward on the same subject. The professor observed, that Mr. Ward, of Wellclose Square, London, had made many experiments on the subject of keeping plants in unventilated vessels, and was the original proposer of the plan for preserving plants in this manner. The discovery of their being able to be thus preserved, was of great practical importance, as it enabled us to bring plants from foreign climates, that could in no other way be introduced into this country. The paper commenced "consider the lilies *how* they grow." The attention of the author was first directed to this point by accident. He had placed under an inverted jar, a chrysalis, and on looking at it some time after, he found a fern and a blade or two of grass had grown under the jar, the sides of which appeared to be covered with moisture. Taking the hint, he introduced some plants of hymenophyllum under a jar, which grew and flourished in this situation. The Messrs. Loddige then enabled him to perform some experiments on a larger scale. The plants were enclosed in glass cases, or small green-houses, made tight with paint and putty, but, of course, not hermetically sealed, and were watered once in five or six weeks. From his experiments, the author came to the following conclusions: First, that confining the air secured a more equable temperature for plants, as its expansion and contraction by change of external temperature, by its relation to heat in those states, prevented any great or sudden change. This was remarkably exemplified in some plants that were brought from India, which were in the course of three months successively exposed to 20°, 120°, and 40° of Fahrenheit. The enclosed plants were very frequently found surrounded by a temperature higher than the external atmosphere. Secondly, that vascular plants required to be grown in a greater quantity of air than cellular. Thirdly, that the light must be freely admitted. Fourthly, that the enclosed air must be kept humid. This can be done by occasional watering, provided any means of escape for the water is allowed, but is not necessary where the water has no means of escape. Besides the advantage of enabling us to bring plants from abroad, it would also furnish to the physiological botanist the means of observing those operations of nature in his study, for which, before, he had been obliged to resort to the forest and the plain. As an instance, the author had been enabled to observe the rapid growth of a *phallus fœtidus*, by merely devoting to it a few hours of the night. The writer concluded by suggesting that this mode of preserving tropical productions might be extended from the vegetable to the animal kingdom.

Professor Lindley also read a letter from the Messrs. Loddige to Mr. Ward, stating that in every case in which his instructions had been attended to, foreign plants had arrived in a state of safety.

The Rev. J. Yates read a paper on the same subject. Wishing, he observed, to make an experiment, on a large scale, which might be exhibited at the meeting of the British Association in Liverpool, a green-house, nine feet by eighteen in dimensions, and with a southern aspect, had been erected in the yard of the Mechanics' Institute, in Mount-Street. It was stocked with foreign plants, of all kinds, to the number of about eighty species. A list of the plants, and observations on their condition and progress, accompanied the report. The general result of the exriment was, that the plants had flourished perfectly well, being in a vigorous and healthy state, without any extraordinary growth. Many of them had flowered, and canna and some ferns had ripened seed. The green-house had no flue, and no provision for any artificial heat. It was judged best to construct it without a flue, both as least expensive, and for the purpose of trying, by a fair experiment, to what extent plants might in this state be kept alive, even during the severity of winter, which would certainly die if fresh air were more freely admitted. It was also to be observed, that nothing had been done to prevent the water from escaping through the yellow sandstone rock, on which the green-house was erected, and hence it had been necessary to give the plants occasionally a fresh supply of water. Mr. Yates further stated, that he had also grown plants un-

der glass in London, where no plant could be made to flourish without such a protection. Nearly a year ago he planted *lycopodium denticulatum* in a chemical preparation glass, with a ground stopper. During that time the bottle has never been opened; yet the lycopodium continues perfectly healthy, and has grown very much, although, for want of space, the form of the plant is distorted. Seeds which happened to be in the soil have germinated, and marchantia has grown of itself within the glass. He also obtained a a hollow glass globe of eighteen inches diameter, and with an aperture sufficient to admit the hand for planting the specimens. A variety of ferns and lycopodiums were then set in the soil, which was properly moistened with water. This having been done, the aperture was covered with sheet India-rubber, its attachment to the glass being made perfectly air-tight. No change of air could take place, except by percolation through the India-rubber, which was every day forced either outwards, as the air within the glass was heated and expanded, or inwards in the reverse circumstance; these ferns grew probably as well as they would have done in a green-house, or hot-house. They were all foreign, and some of them requiring great heat. Several had ripened seed.

Mr. Gray stated, that he had grown droseras under glass jars; one circumstance with regard to them he thought worthy of remark, their leaves did not turn red, as is usual when exposed to the atmosphere. Professor Graham observed, that although in Mr. Ward's experiments atmospheric air had been admitted, he did not think it essential to the welfare of the plant. Plants grown in this manner only required a glass large enough to contain a sufficient quantity of air, to permit of the absorption of oxygen without deteriorating the air of the vessel to such an extent as to injure the plant. The want of red in the leaves of drosera, he thought, depended on the presence of moisture. A singular point was, that plants growing naturally in arid soils and climates, flourished in the humid and confined atmosphere of the closed jars. He had placed under jars completely closed some plants of cacti, which had flourished more than those not so situated. He did not think that animals could be sustained in the same manner, as they consumed all the oxygen which they inspired. Dr. Travers remarked, that he had seen common mould, which was a species of fungus, in a tube which had been heated and hermetically sealed for two years. Mr. Bowman had observed at the Duke of Devonshire's, Chatsworth, that droseras did not, under the jars, change the color of their leaves as in open air. He wished to know of Dr. Graham, how long his cacti had lived in a moist atmosphere; they were naturally, at certain seasons of the year, exposed to heavy rains. He thought it was very possible for plants and animals to live together. Mr. Duncan inquired if plants were healthy, and fit to be transplanted to the open air, when treated in this manner. Professor Graham stated, that the cacti had lived without access to air eighteen months. He believed that plants and animals might live together, provided the vessel in which they were inclosed was sufficiently large to enable the plants to absorb the carbonic acid gas, expired by the animals. This would be a representation in miniature of what takes place in our own world. Professor Lindley, in reply to Mr. Bowman's question, stated, that plants suffered little when confined in carefully closed vessels. From improper treatment they may become debilitated, but he had seen them arrive from foreign countries, when treated in this manner, in the most perfect state of health. Want of skill in the management of those brought from abroad was the most frequent cause of injury. Too much water was frequently given to plants when just packed. They had better be placed in too dry, than in too moist an atmosphere. He had seen this illustrated in plants from India; plants exposed to too much moisture rotted very soon. He thought the change of color in the leaves of plants depended on their free exposure to light; the droseras mentioned, had not been exposed to the free access of light; this was certainly the case with the droseras at Chatsworth and of Mr. Gray. The discovery of Mr. Ward was not only important in enabling us to import foreign plants, but it also rendered the ventilation of green-houses less necessary, and would enable gardeners to manage the artificial climate of their hot-houses with less difficulty. The fact that cellular plants grow best under this mode of treatment, was well established. In answer to a question from Professor Lindley, Mr. Gray and Mr. Yates stated, that plants had both flowered and fruited under this plan of treatment. Professor Graham stated that the order in which he had found plants to grow best, was: 1. Lycopodiums; 2. Grasses; and 3. Begonias.

LIME AS MANURE.

We are pleased in laying before our readers the following valuable communication of Judge Hayes, as he is considered one of the best farmers in the country, and his experience will be valuable to others. His beautiful and productive farm gives evidence that the hand of industry is directed by intelligence. Other communications from the same source will be very acceptable.—*Yankee Farmer.*

South Berwick, March 29, 1838.

Mr. S. W. Cole:—Your letter of the 22d inst. requesting information in relation to the use of lime as a manure, has been received. My professional engagements have engrossed all my time till the present moment. I have no very particular knowledge on the subject, but will with pleasure state to you in what way I have successfully used lime as a manure, and how I have known it used by my neighbors.

I have used on my farm from ten to thirty casks of lime every year for the last twenty years; and have found it beneficial. Although a portion of my farm and buildings are on high ground, still between that and an adjoining swell of land there is a muck swamp, which formerly must have been a deep pond, and has been gradually filled up with vegetable matter, till the surface has become level with the adjoining land. This swamp is on higher ground than my barn-yard, and about twenty rods therefrom. The muck is inexhaustible, and is very easily hauled to the barn-yard. Immediately after haying, when the ground is very dry,

I cart out about sixty or seventy loads of this muck, which is very sour when taken from the swamp; and I endeavor to manage it in such a way, as will correct its acidity, and make it food for plants. I have yards for my stock all around my barn. On the eastern side and southern end are yards for sheep, and on the western side and northern end are yards for neat cattle, surrounded partly by a high wall and sheds, under which there is a well of never-failing water. When the muck is taken from the swamp, about forty loads of it are dropped in the sheep-yards. Here the muck is spread and the sheep lie on it during the ensuing winter. The next spring immediately after planting, this muck, together with the sheep manure as well that in their yards, as that in the sheep-houses, is hauled round to the yards used by the neat stock on the farm. Here it is spread over the yards and intermixed with unslacked lime. The cattle tread over and lie on it during the summer, when in the yards. These yards are ploughed and harrowed, and more lime applied several times during the summer. The manure made in the barn during the winter is thrown into these yards, and the cattle during the whole foddering season, when not in the barn, lie there. As the yard is well supplied with water raised by a pump, no portion of the stock, except the working oxen, go out of the yard from fall till the next spring, when they go to pasture. The muck, lime, litter, manure and urine from the stock being well intermixed form a valuable compost, which in the spring is all applied to ground newly broken up, except that portion which is applied to root culture, other than potatoes.

My buildings are situated on the side of a high swell of land inclining to the west. The stable is connected with the house by a large shed, and on the further side of the stable is a hogs' yard, in which the manure from the horse stable is thrown. On the backside of the shed is a drain made of pine plank, free from sap, ten inches wide and four inches deep, covered with plank and dirt in those places where an open drain would be unsightly or inconvenient. This drain has been in use twenty years, has been renewed but once, and is now in good repair. The ground inclining, favors this arrangement. By means of this drain all the soap-suds from the kitchen, water from the sink, &c. must pass through the necessary vault, by which it is kept clean, to the hog-yard. A portion of the hogs on the farm are kept in this yard, and a dry and warm apartment is provided for them under a part of the stable. As soon as the yard is cleared of the manure in the spring, we begin again to fill it with muck taken from the swamp the year before, putting in at first five or six loads, and one or two casks of lime, and so on, muck and lime every few weeks during the summer. The manure of one horse in the summer and generally of two in the winter is thrown into this yard, and is often spread over the yard. During the warm season more lime is used in the yard, and scattered in the drain, whence it is washed into the yard, and thereby every unpleasant smell is prevented. All the leaves and dry litter which can be procured are placed in the apartment under cover for the hogs to lie on; and all the green weeds and wet litter which can be obtained are thrown into the hog-yard. The muck being formed of vegetable matter which has been decomposed without fermentation, is very bulky in proportion to its value as a manure—but is of some value in itself, and serves as a sponge to take up and preserve the juices and gases of the putrescent manure, which might otherwise be lost. Turf from a good soil, if it could be obtained without injury to the farm, could be used in the same way to equal advantage. By means of the muck, lime, horse-dung, litter, leaves, weeds, soap-suds, wash from the sink, necessary, &c. we make in this yard about fifty loads of the very best manure. Formerly in the spring we were accustomed to shovel this compost out of the yard, and suffer it to lie in a heap a few weeks till wanted to be spread on the corn ground. While it thus laid in a heap, it would become very much heated by fermentation, so that it one year killed a large elm-tree, about which it was thrown. For several years last past we have not thrown it from the yard till it has been shovelled into the cart to be conveyed to the ground where it is to be used. I have not observed but what the compost is equally efficient, when used without the fermentation produced by throwing it out of the yard. We generally keep a cask of unslaked lime in the cellar under the house, and another in the cellar under the barn, and scatter unslaked lime on that which is partially air-slaked, on the bottom of the cellars and in the pens from which the vegetables are removed. This lime is occasionally swept up, and carried to the manure-yard, and fresh lime again applied. In this connexion permit me to recommend the yearly use of whitewash in dwelling houses and cellars. With great gratitude I can say, that I have one of the largest, and most healthy families in the county, and I have no doubt but the liberal use of lime about my dwelling houses and appurtenances has contributed more than any other cause to preserve their health. I cannot accurately state the value of lime on the farm when used in this way, but am confident that it is much cheaper than to purchase manure at the usual price.

Until within a few years very little lime has been employed by my neighbors as manure, and the method in which they apply it, is that which is best adapted to general use, and is as follows:

Select a spot of ground near the place where the lime is to be applied to the soil by the side of the highway or in the pasture, where turf or rich vegetable mould can be obtained without injury to the farm. Spread a cask of unslaked lime on such a spot, then cover it with turf or vegetable mould, and so on alternate layers of turf and lime till the heap is raised three or four feet, or until the turf or good vegetable mould within reach has been used up. Then select the next best spot for the same operation, and so on till the lime is used up. This is suffered to lie in a heap till the next spring, when the heap is cut down perpendicularly, shovelled into a cart, hauled on to the ground where it is to be applied, dropped in very small heaps, and spread *suantly* (a Yankee word) over the ground which has before been ploughed and harrowed. The precise quantity which good economy would require should be applied to the land has not been ascertained, but I can safely say that from ten to fifteen casks per acre, at from one dollar to one dollar twenty-five cents per cask, prepared and applied as above-stated, would on scarcely any land be an injudicious appropriation of money. The use of lime in this vicinity has

been extended yearly, as its good effects have been ascertained. It is believed that lime renders putrescent manure more efficient, when both are applied to the same land.

I have thus hastily answered your inquiries. If you think these remarks of no value, throw them aside, but if you think they will assist any one in the management of his farm you will make such use of them as you think proper.

Yours, &c.

WILLIAM A. HAYES.

P. S. I would remark, that very little wheat is raised in the lower part of the county of York. It is generally destroyed by rust. In the few instances in which I have raised a good crop, the wheat has been sown on very high land. The publication of this fact may induce others to observe whether wheat is generally more likely to escape rust on high ground.

W. A. H.

The two following communications were among those elicited by the queries on marling, stated in the 8th number (page 510) of last volume. The shape in which these are presented, is not that of special and particular answers to the queries, and, in addition, the limited range taken by each correspondent, (and permitted by his limited though valuable experience of results,) forbids the change of form required by the plan of digested information proposed in connexion with the queries; and therefore they cannot be advantageously used in aid of that plan. Nevertheless, the facts furnished are interesting and instructive, and as independent communications, the pieces are of a value of which we would be unwilling to deprive the readers of this journal.

Should any other correspondents than those to whom we are already indebted, attend to our former request on this head, we beg to remind them that unless they give special answers to the queries, (or to such as their experience permits, passing over the others,) their communications cannot be used as part of that plan of furnishing information on this important subject. But any other form of communication, however limited in range, or different in plan, and more agreeable to the writers, will be gladly received and published, as these are, as independent articles.—ED. FAR. REG.

LIMING AND MARLING IN MATHEWS COUNTY.

To the Editor of the Farmers' Register.

Mathews, Virginia, December, 1837.

Your circular letter of last month was received by mail, but it has not been convenient to make a reply until now. You request that the answers may be made in the order of the queries. As the use of marl has been very limited in extent and recent in this county, it may be more desirable to state what little information I have been able to obtain, from experience or observation, in an embodied shape.

I infer from the object of your undertaking, you wish to ascertain the effects of the carbonate of lime, in whatever mode it may be applied to the soil—whether in the form of shell lime, stone lime, or marl. I will therefore proceed to state my experience in the use of lime and marl.

I was, so far as my information extends, the first person who commenced the systematic application of lime to the soil in this county. Some had applied lime carelessly, without knowing its mode of application or its effects, and the consequence invariably was, a too heavy dressing, and the consequent injury sustained therefrom. It had been applied in small quantities from shell kilns or old mortar, and put on the land in the same manner rich earth or dunghill manure would have been applied. Hence, invariably, the spots where the lime had been thus applied, were rendered for some years unproductive, if not absolutely steril. Hence followed the condemnation of lime as a manure. When I commenced the use of it in 1833, I was told by many I should utterly ruin the land wherever I put lime. Marl has not been used by me until the present year. There is no marl in this county, which is accessible for agricultural purposes, except a small part of the county bordering on the Piunkatank river. Those who use marl, are consequently under the necessity of transporting it by water from some of the river marl banks. I have this year brought from York river in a vessel between 3,000 and 4,000 bushels of marl, at an expense of 6 cents per bushel when on my landing, which I and two or three of my neighbors contracted with a gentleman on York river to deliver on board vessels at 2 cents per bushel. The freight cost 3½ cents, and the expense of landing half a cent; which will make six cents per bushel. The expense of carting and spreading you have estimated, I think, at about half a cent per bushel. It costs me more than double that sum, as I am careful to have it measured in bushel boxes at measured distances, and spread with great care, so that I do not imagine the expense of applying would fall much short of two cents per bushel. Thus my marl, when put on the soil, stands me near eight cents per bushel. I put on from 100 to 150 bushels per acre. It contains by analysis 67 per cent. of carbonate of lime. One hundred bushels of marl would therefore be equal to sixty-seven of shell lime and 150 bushels to 100 of lime. I cannot state the effects of marl on the soil, as it has not had an opportunity of exhibiting its powers. One of my neighbors, year before last, (1835,) had a load brought from some of the river banks, and applied it to a wheat fallow with good effect. Certainly, his wheat was better than his neighbors', although it was a most unfortunate year to all wheat-growers. As we have so recently begun the use of marl, I cannot say any thing farther of its effects, but may do so at a future time, when they shall be perceived. I suppose there have been about 15,000 or 20,000 bushels of marl brought to this county by water, at an expense according with the foregoing estimate. There have been about 400 acres marled or limed in this county.

Having related all I know of the use of marl in this county, I will proceed to detail my experience in the use of shell lime. I have applied it in various quantities, from 25 to 100 bushels, and from observation, I think on land of common quality, containing some vegetable matter, that 70 bushels is about the proper quantity, although I

have perceived as good effects from half the quantity.

My first application of shell lime, was on a fallowed lot of about 10 acres. This lot was very poor. It had been completely exhausted by a wretched cultivation without ditches. It would not have produced a barrel of corn to the acre. To a moiety of this lot, I applied lime at the rate of 100 bushels per acre on the ploughed surface without any other manure, harrowed and sowed rye over the whole lot. As far as the lime extended, the rye was killed as fast as it vegetated. The quantity was too great for the poverty of the land, and for a top-dressing. I saw my error; but my neighbors who had predicted a failure, smiled and said, "I told you so." The next spring I ploughed the land as far as the lime had killed the rye, and sowed oats. It produced a good crop. The rye was scanty. The next year I ploughed the same lot and planted corn. As far as limed, it produced by estimate three barrels of corn, the unlimed moiety not more than a barrel to the acre. After corn, the limed portion was sown in wheat. A little farm-pen manure was scattered lightly as a top-dressing on part of it, the remainder had none. Clover was sown on the wheat in the spring and harrowed in. The wheat was tolerable; about 8 bushels per acre. The clover which followed took well, and produced a pretty good crop. A part of it was cut for food. My neighbors were a little astonished, nay, they were convinced, and from that time has lime been looked upon favorably, and some exertions made to obtain it for manure. This lot laid two years in clover not grazed, was fallowed this fall; the unlimed moiety was marled on the surface (150 bushels per acre,) and manured with stable and farm-pen manure, and the whole lot sown in wheat. It is up, and now looks well. The portion marled did not destroy the wheat as the lime did the rye in the first instance, although the proportion of carbonate of lime was about the same in both cases. It is true the marl had manure with it, which no doubt prevented any injury from that mode of applying it. The lime had no manure to prevent injury from its causticity.

On another lot containing about 15 acres, which had been also reduced to as low a degree as that just described, I applied lime in the following manner. This lot had been permitted to lie two years without cultivation or grazing, and a heavy coat of coarse water-grass had grown up on it. It had been subjected to water, and was much water-sobbed, and very close. It is what is called a 'crawfish soil.' I had the whole lot ploughed up in the latter part of the summer, when the grass on it was yet green, and after being ploughed, I put on about one-fourth of the lot lime at the rate of 70 bushels, on another fourth at the rate of 35 bushels, and on the remainder no lime. The whole lot was planted in corn. As far as the lime went, there was no visible difference in the corn. The land containing 70 bushels produced no better than that which had only 35 bushels of lime. But up to the line where the lime ceased, the difference could be seen in the corn. That limed was estimated to produce three barrels, that not limed one barrel and a half of corn. Let us now see how the cost would stand. I purchased this lime from persons whom I employed to collect shells, burn them into lime, and deliver it at my landing at 10 cents per bushel; the cost therefore per acre would be as follows:

70 bushels lime at 10 cts. per bushel,	$7,00
Carting and spreading, say 2 cts.,	1,40
Whole expense per acre,	$8,40
Difference of product between the limed and unlimed:	
1½ barrels corn at $4,50,	$6,75
Balance of cost for the first year,	$1,65

The next year the same lot was put in oats—the limed was doubly as good as the unlimed, and more than paid the balance due from the expense of liming. If the calculation be made at 35 bushels of lime per acre, a profit would accrue the first year as follows:

35 bushels lime at 10 cts.,	$3,50
Carting and spreading, 2 cts.,	70
Expense per acre,	$4,20
Difference of product between the limed and unlimed:	
1½ barrels corn at $4.50 per barrel,	$6,75
Profit per acre,	$2,55

From this statement, the conclusion may be drawn, that the smaller quantity is as beneficial to the first crop as a greater; but it would require a speedier repetition of the lime, and I do not doubt the larger dressing will effect a greater ultimate improvement of the soil.

My observation of the effects of carbonate of lime, has in no instance discovered any thing contradictory of the positions laid down in your 'Essay on Calcareous Manures;' on the contrary, so far as they have extended, have been confirmatory. It has confirmed the facts: 1st, That where lime is applied sorrel will disappear. My land, where lime was put, had been very subject to the growth of sorrel. It was a cold, compact, sour soil, but becomes more open, puts up a different growth of grass; and I noticed on a lot partly limed and partly not, that the cows, when permitted to graze it, would invariably go to that part which had been limed; thus showing that a sweeter and more nutritious grass grew on it. 2d, That lime renders land fit for wheat which had not been before adapted to that grain. I have cultivated wheat with success upon land which had never been considered adapted to wheat, and had never produced that grain until lime was applied. 3d, That it causes clover to grow luxuriantly on land that would not previously produce it. Here I would remark, that I have been strongly impressed with the conviction, that your views of the action of gypsum on land after liming, are correct. I never could believe the old opinion, that the sea air operated to prevent the action of this powerful manure. Your view is more reasonable and philosophical. I had used gypsum on some of the same land now limed, before it had been limed, without perceiving the least benefit. It is my intention next spring to try it again on the same land. The results I may perhaps communicate, as I look upon it as a matter of great importance to all who design to lime or marl their lands.

WM. SHULTICE.

MARLING IN QUEEN ANNE COUNTY, MD.

To the Editor of the Farmers' Register.

Wye, Queen Anne County, Md.,
10th December, 1837.

I observe your queries in the last number of the Register, and wish I could answer them, or some of them, with accuracy to satisfy myself. I commenced the application of marl in 1824, with but little knowledge of its action, and have kept no memoranda. About the same time, I began the use of marsh mud, and found its immediate effects so much more productive, that the marl was neglected. In the year 1833, your book on Calcareous Manures was recommended to me by the late Col. Edward Floyd of Talbot. Your views on the subject have induced me to turn my attention principally to marl, for improvement of my lands. From two fields of about 45 acres each, marled for the most part since that time, and an intervening crop of clover, I gathered this year six hundred barrels of corn, and it is not in my recollection that they ever before produced more than four hundred; a small quantity of putrescent manure being carried out as usual. My marl is blue, mixed with sand, and our geologist, Dr. Ducatel, states it at 45 and 50 parts of shell. I applied 500 bushels to the acre.

WM. CARMICHAEL.

FARM REPORTS:

III.—*Netherby, Cumberland, (England.)*

MANAGEMENT OF THE HOME FARM.

The management of the Park of Netherby, the extent of which is upwards of twelve hundred and ninety statute acres, (independent of the woods surrounding and interspersed through the grounds,) comprehends the practical detail of a large grass and arable farm, managed on principles suited to the climate and local situation of the country, and occupied by the proprietor, not only with a view to the permanent improvement of the lands, but also to securing the largest return possible from them.

The detail is conducted by an active overseer or bailiff from one of the best-managed agricultural districts of Scotland.

The establishment consists of four regular ploughmen, each having the charge of a pair of horses; a steady elderly person, who has the charge of the granaries, and who superintends the field operations of hand-hoeing, reaping, &c.; and a park-keeper, who acts in the double capacity of superintendent of the whole grazing stock of cattle and sheep, and as butcher to the family. There is, besides, a person whose sole business it is to attend to the open and close draining of the lands about to be described, and whose services are of much consequence towards their good management. All these under servants have been very carefully selected. The female part of the establishment consists of a dairy-maid and an assistant in the cow-house. The establishment is so arranged that all hands are fully employed. All extra labor required at hay and corn harvest, and in hand-hoeing the various crops, &c. is very readily commanded from the adjoining market town of Longtown. Every account and payment incident to this establishment is kept by the overseer, and is regularly audited and settled by the agent once a month; and a copy of the monthly account is duly put into the proprietor's hands, who is thus enabled to have the real situation of his farming matters constantly under his eye.

Extra work, such as mowing, draining &c. is let by contract to laborers.

Description.—The management about to be described extends, as already mentioned, over about twelve hundred and ninety acres. The soils are of various descriptions, and consist of the following general divisions:

1st. On the banks of the river Esk, which cuts the grounds into two portions, the soil is a loamy clay on a porous bottom, and very various in point of quality, as is generally the case with all lands whose formation is the deposite or washings down of lands situated at a higher level. These lands are under permanent pasture.

2d. A mossy soil of no great extent, but of considerable depth, incumbent on clay, now irrigated meadow land.

3d. Gravelly soil, on an open bottom of gravel, technically called a rusty gravel, held in pasture or alternate husbandry; and,

4th. A clay soil of various qualities on a close till or stubborn clay subsoil, unsuited to constant pasturage, and therefore kept in alternate husbandry.

The lands consist of about 480 acres loamy clay, 28½ acres meadow, 320 acres gravel, and 462 acres clay soils.

The aspect is generally flat, but with a gentle undulating surface, and with a moderate inclination from the river which runs through the lands in a direction from N. E. to S. W. The whole lands lie compact and in a ring fence, and form together a very beautiful park, equal to any in the north of England, not only in point of appearance, but in real value, while these lands do not lie at more than from 70 to 120 feet above the level of the Solway Frith. The management of each kind of soil being different, requires a distinct and particular description, as will be found in the following account.

The farm buildings at Crofthead stand very nearly in the centre of the grounds, which has been found of great advantage in their management.

Longtown.—A considerable market town, containing from 1800 to 2000 souls, through which the great road from Edinburgh to London by Carlisle passes, is situated at the S. W. angle of these lands.

No manure can be procured here except what is produced on the farm, in the farm-yards at Crofthead, and what is purchased at Longtown. Of the last—as the farmers in the neighborhood procure all they can—no great quantity of manure can be obtained. There is abundance of lime, however, to be got within four miles, at a price averaging about 3*s.* per single cart-load at the lime-kilns, or 4*d.* per imperial bushel. No chalk, clay, or shell marl is found in the neighborhood, and the chief dependence is on dung and compost made on the lands, and lime as already stated.

Turnips are indeed consumed on the lands, where the soil is dry, by sheep.

A trial is just now in progress of using bone dust, as a manure for the production of turnips; and if it succeeds, as is expected, this assistant will be much used here in future.

Draining.—The first operation of management has been *in every case* to ensure a complete underdrainage, to relieve the lands from the springs by which they were surcharged, as well as attending closely to open draining. The improvement of close draining has been most effectually done by tiles manufactured on the estate, at a distance of about three miles, and in the same manner as is practised in Staffordshire and Warwickshire. Many hundred roods of drains have been executed in this way, and with complete success. The open draining has also been a point of paramount consideration. The ditches, or main drains, have always invariably been cut out to the proper level, so as readily and freely to discharge the water delivered into them. The sides are carefully sloped back by the spade, so as to discharge the water from the ridges; and the earth so cut away, as well as all high head-ridges have been in every case most carefully mixed up with lime, repeatedly turned over at proper intervals, and, lastly, applied as a rich compost in top-dressing the adjoining lands, after being depastured for the first two or three years. It is very surprising that sloping in the sides of main drains, and open ditches, which is a means of providing an ample supply of rich manure in thousands of cases, is almost invariably neglected by the practical farmer; and that he should equally neglect to remove the high head-ridges existing in almost every field (occasioned by the repeated use of the plough), which would be the means of enriching the adjoining lands at an inconsiderable expense. This, with ditch and road scrapings, and every possible means of increasing the quantity of putrescent manure, have been closely and successfully attended to here, and with great success; and as the application of compost so collected has been almost in all cases to pasture lands, the effect has been excellent; while the grounds, when broken up for white crops, after being so manured, have —even on very inferior soils—yielded full and fair crops. Indeed the system pursued for a number of years, of turning every particle of soil not required for the production of useful crops, into compost to be applied as a top-dressing to the grass lands has been found very beneficial.

Management of Pasture Lands.—The climate here, in common with the whole west coast of Britain, is rather wet; and considerable quantities of rain fall in Cumberland, in consequence of its proximity to the Atlantic. Dry soils therefore are of the greatest value here, and grass husbandry on many accounts is the most proper and natural for the district.

When lands are well and judiciously laid down to permanent pasture, the expense of their management is at once reduced. The local situation of this part of Cumberland, bordering on Scotland, renders it in a great measure a grazing or cattle-dealing country, and pasture land, of a good quality, is constantly in request, and yields full and fair rents, when let from year to year; or, when farmed in a run of seasons, it produces, either by cattle or sheep, a fair return to the grazier. The greatest part of the cattle and sheep sold in the great Scotch markets, in Galloway, and the north of Ireland, pass through this country to Carlisle, the great point where they change hands.

Old Grass Lands.—Around the house of Netherby a very considerable extent of old grass land exists. This has been completely underdrained; and as it was disposed to produce moss—so as to render the pasturage late in coming to maturity—a very heavy dose of *hot lime* was applied about ten years ago to the whole, with remarkably good effect; for after the first year's application, the moss was eradicated, and the pasture is now unrivalled in the country. The soil alluded to is generally good clay loam on an open bottom.

New Grass Lands.—Whether on light or heavy soils, it has been the constant custom here, in the first place, to lay the lands completely dry by under-draining; then to clean and pulverise the lands completely by summer fallow or green crops; to apply all the prutrescent manure that could possibly be produced or purchased at a fair price. On light soils, turnips are consumed, by sheep folded on the grounds; and on clay soils, the turnips, if any are produced, have been regularly consumed in the farm-yards, and the manure so produced has been applied to the ensuing white crop. In all cases, supposing the lands (of whatever description of soil they may consist) to be thoroughly cleaned, the course here has been to sow out to permanent pasture with the *first* white crop, and with the following variety of pasture seeds, *viz.*

If Clay Lands,

Timothy Grass - - -	Pleum pratense.
Pacey's Ryegrass - -	Solium perenne.
Red Clover - - - -	Trifolium pratense.
White Clover - - -	Trifolium repens.

If Light Dry Soils,

Pacey's Ryegrass - -	Solium perenne.
Red Clover - - - -	Trifolium pratense.
White Clover - - -	Trifolium repens.
Cocksfoot - - - - -	Dactylis glomerata.
Rib Grass - - - -	Plantago lanceolata.

Hay *is never* taken from lands intended to remain in permanent pasture. These lands, whether heavy or light soils, are constantly depastured with sheep for the first season. If clay lands, the grass is depastured from 1st May to 11th November, and if light soil, from 1st May to 1st March yearly; and no stock of any kind is admitted on either description of soil between the terms mentioned. The second year any ordinary description of stock is admitted. In the course of years it has been found necessary to break up some part of these lands, and to lay them down anew to permanent pasture: the following varieties of pasture seed are now sown and approved of here.

Clay Lands,

Timothy Grass - - -	Pleum pratense.
Cocksfoot - - - - -	Dactylis glomerata.
Meadow Fescue - - -	Festuca pratensis.
Dog's-tail - - - - -	Cynosurus cristatus.
Meadow Cat's-tail - -	Pleum pratense.
Pacey's Perl. Ryegrass	Solium perenne.
Red Clover - - - -	Trifolium pratense.
White Clover - - - -	Trifolium repens.

Light Lands,

Timothy Grass - - -	Pleum pratense.
Pacey's Perl. Ryegrass	Solium perenne.
Cocksfoot - - - - -	Dactylis glomerata.
Rib grass - - - - -	Plantago lanceolata.
Dog's-tail - - - - -	Cynosurus cristatus.
Mixed Fescues - - -	Festuca duriuscula, Festuca, pratensis, &c.
Mixed Poas - - - -	Poa pratensis, Poa cerulea, &c.
Red Clover - - - -	Trifolium pratense.
White Clover - - - -	Trifolium repens.

The inferior description of clay lands in particular have been much improved by opening the furrow every autumn, about the month of November, by means of the furrow draining plough—an implement of simple construction, but one that cannot be too well known by the agriculturist. Its object is to cut a furrow slice out of the already existing furrow, 6 or 7 inches deeper, while its mould board, formed of wood, throws this slice 8 or 9 inches clear out on the right-hand side of the plough—thus forming a complete (we may say almost invisible) drain—which lays the land dry, and which discharges all superfluous water through the ensuing winter, while the furrow slice so removed is an addition to the compost heap. This simple implement has been of the greatest use here, and is strongly recommended to all farmers of wet clay lands.

Double Digging or Trenching.—Last year, during the distress of the hand-loom weavers, a large extent of ground of a very stiff clayey nature was trenched by those out of employment, in order to employ them. The deepness trenched was eighteen inches, and the inequalities of the surface were regularly reduced and attended to, and the grounds planted with potato and mangel wurzel, properly drilled and manured. Next year wheat will be sown, and the ground laid down again to permanent pasture.

Irrigated Meadows.—Here there are 18½ acres of water meadow on the ridge or bed system, and about 10½ on what is termed catch-work. It happens unfortunately that the water collected in a brook, descending through the lands to the Esk, is hardly sufficient, except in floods, for the purpose of complete irrigation. But the heavy crops produced even under imperfect watering, leave no doubt, however, of the utility of this branch of agriculture.

There are no other meadows here, and indeed the want of meadow ground is seriously felt over this district. In the general management of the pastures, care is taken to eradiate docks, thistles, &c., from the surface; and moles are destroyed whenever their workings appear.

ROTATION OF CROPS.

The plough rotation followed on these lands has been as follows—on

Gravelly soils.—1. *Turnips.*—Generally Swedes or Aberdeen yellows, consumed on the ground by sheep.
2. *Barley.*—Sown about the middle of April with seeds for pasture: the lands laid generally quite *flat* in the surface.
3. Young grass seeds depastured by sheep; generally ewes and lambs, from 1st May to 1st March.
4. Pasture.
5. Ditto.—Top-dressed this season with compost.
6. Pasture.
7. Pasture.
8. Pasture.
9. Oats out of ley.

Clay lands of the best description.—1. *Summer fallow*, or, if the season is suitable, globe turnips. In either case, the land thoroughly cleaned and manured. Turnips pulled and consumed in the yards by cattle.
2. *Wheat*, sown in autumn; and grass seeds for pasture sown in the succeeding spring: no stock of any kind allowed to depasture these seeds in the ensuing winter.
3. *Young pasture seeds*, depastured by sheep from 1st May to 11th November; but unless the ensuing winter should happen to be particularly dry, no stock admitted after that period.
4. Pasture for the same period.
5. Ditto, ditto.—Top-dressed with lime or compost.
6. Ditto, ditto.
7. Ditto, ditto.

If the lands now begin to show moss, so as to hurt the pastures, and render the grass later in coming to a full bite, they are generally ploughed for oats in the eighth year, about the middle of winter, so as to derive advantage from atmospherical influence, and are ploughed with a strong furrow.

Clays of the second-rate description.—1. *Bare fallow.*—Thoroughly cleaned, limed, and manured; the greatest pains being taken in all cases of clay land in the ploughing, so as to give the ridges a proper shape, to discharge all surface-water from the centre to the furrow.
2. *Wheat*, of the red kind, or oats, sown out with seeds for pasture.
3. *Seeds*, depastured by sheep from 1st May to 11th November.
4. Depastured by any kind of stock from ditto to ditto.
5. Depastured by any kind of stock from 1st May to 11th November. Top-dressed with lime or compost.
6. Ditto, ditto.
7. Ditto, ditto.
8. Oats out of ley.

These various courses of cropping have been found to suit the lands extremely well. The application of lime or compost to the third year's pasture, is a point never overlooked; for it is found to renovate the pasture grasses, and the grounds, after an interval of two or three years, break up in capital condition for oats.

Wheat.—The wheat sown on the best descriptions of soil is invariably the white kind. That most in request for seed is understood to be what is called, in East Lothian, "Hunter's wheat." Wheat, after summer fallow, has always been found of the best quality and greatest weight to the acre; on inferior clays, red wheat is often sown. This variety is certainly well suited to such soils, and often fair average crops are obtained; but it is thicker in the husk, and therefore not so much in request with the corn-factors. The price in the market is generally one shilling per Carlisle bushel under the price of white wheat.*

*A Carlisle bushel is equal to 3 A imperial measure.

Sowing.—The quantity of seed wheat to a statute acre sown broad cast, is from two and a half to three imperial bushels. The usual return, in favorable seasons, may be about from thirty-four to thirty-eight imperial bushels per acre.

Period of sowing.—On summer fallows, wheat is sown about the second week of September; and if wheat is tried after turnips, fed off on the lands by sheep, which is sometimes the case on lighter soils, the sowing being performed during the winter months in proportion as the turnips are consumed.

Tares or vetches—Are seldom or never sown in this district. They answer, however, admirably in this district on fresh soils: they have invariably yielded a very large return of green food for soiling, and have been sown on purpose to be ready to be cut as green food, between the first and second crops of clover. Tares are never made into hay in this district; and indeed from the great quantity of succulent matter they produce, in a variable climate, the process of making them into hay would be attended with much risk and probably little advantage. They are very useful when consumed in summer, in soiling by cattle or horses, and thereby adding greatly to the dunghill—a point of paramount importance, but in no other light is their culture recommended.

Rape.—Rape succeeds here very well on lands in fair condition. An experiment on rather a large scale, was tried about eight years ago, of sowing in the month of July, no less a quantity than 120 acres of land of the first-rate quality—of loam intended for permanent pasture—with rape alone. The ground was previously thoroughly cleaned and limed, the rape and grass seeds sown, and the rape, immediately on arriving at maturity, eat off by sheep. The effect has answered, and the lands in question are the best pasture in the country at this moment.

Turnips.—The turnips sown here are the globe, the Aberdeen yellow, and the Swedish; all these varieties, when the seed is good and fresh, and the proper culture followed, have invariably succeeded here. The globe is consumed first, then the Aberdeen yellow, and lastly the Swedes. A number of other turnip seeds have been tried, such as the tankard, the green round, &c.; but from experience, the three kinds first named are decidedly preferred.

Drill husbandry.—Turnips are always drilled here, and without a single case of failure. The turnip husbandry of East Lothian and Berwickshire is followed from first to last. The crops produced are generally heavy, sound, and good, even on the stiffest description of clays. These crops are either consumed in the farm-yards by cattle, or on the ground by sheep. In eating off turnips by sheep, the practice here has always been at first to confine the flock on an extent calculated to support them fully for one week, and to give them a fresh break once a week afterwards, allowing the flock the range over the first portions of ground allotted to them. Hay, in sheep-haicks or cribs, is given along with turnips; Swedes are undoubtedly a most valuable crop to the farmer, and are the favorite food of all sorts of cattle and sheep. It is the custom in this establishment also to give the working horses, in the winter and spring months, a considerable proportion of Swedes daily; and the effect is to make the animals eat their oats with more avidity, and to render them more fresh, and their coats more glossy. No other crops (potatoes, beans, and mangel wurzel, excepted,) are drilled here. On the light soils, however, there is not the least doubt that all the white crops may be drilled and hand-hoed with the greatest advantage; and it is in contemplation to resort to this mode of culture in future, as the most garden-like management, and as yielding a heavier and better description of grain, while at the same time all annual and other weeds are destroyed. Swedish turnips are sown in the latter end of April or beginning of May; globe and Aberdeen yellows during the first and second weeks of June. It is proper to mention, that the sheep generally fed off by turnips, are the best description of Cheviot wedders from Sutherland, Roxburgh, and Dumfrieshire. Ewes and lambs on turnip, are seldom or ever attempted here. It would be reckoned very slovenly management to allow turnips to sprout in spring; they are always consumed when perfectly sound in the bulb, whether in the yards or in the fields.

Barley.—Barley succeeds turnips which were consumed on the ground by sheep: of course these crops can only follow with advantage in rotation on turnip soils. If the turnips have been properly managed, as already described by the eating them on the ground, the lightest soils will be compactly beat together by the treading of the flock. One furrow on such soils is considered in general sufficient, and the proper time of sowing is from 1st April to 20th May. It is here proper to state, that barley after turnip should be sown *hot furrow*, that is to say, the sower should immediately follow the plough, and the harrow the sower; and probably, if the weather appears to set in droughty, the grass seeds and roller should close the scene behind the harrows. When the process of barley-sowing is conducted in this way, a failure of crops has never taken place here. Pure barley alone is sown; and the old variety, called rough beer or big, seems, with much propriety, to be quite out of fashion in the district. These grounds seldom fail to produce barley of an excellent malting quality; indeed, the vale of the Esk is celebrated for the good quality of its barley crops.

Grass.—Grass never fails to succeed here after barley. If it is intended to cut the grass crop green for soiling, ryegrass, with a large proportion of red clover, and a small proportion of white, are sown. The soils here, from the management described, are generally fresh; and not one single case is remembered where the clover crops have failed altogether on any of these soils.

Ryegrass—As a hay grass, is a very valuable variety; but when land is intended for permanent pasture, or for lying a number of years, ryegrass does not appear to be so well adapted as many other varieties for grazing purposes, and hitherto too much seed of this kind has been sown here on permanent pasture lands.

Fiorin Grass has never been cultivated here. It is probable, however, that practical agriculturists may, in many cases, entertain unfounded prejudices against this grass. A small fiorin meadow, as a trial, is in the progress of being laid out at present.

Sainfoin is never sown in this district, and clover is seldom or never sown without a mixture of

grass seeds along with it. One experiment, on good land, of sowing red clover only, succeeded admirably.

Potatoes, under good management by the drill system, never fail here, even on the clay soils. No great quantity, however, is ever grown on this farm, except for the use of the family.

Mangel Wurzel has been cultivated for two or three years. The growing of this esculent is, however, quite new in the district, and is therefore only cautiously attempted at first. The result, hitherto, is favorable, although the Swedish turnip is supposed to be a crop of equal value.

STOCK.

As feeding cattle for the butcher has always formed a principal point in the management of these lands, it is considered a matter of importance to select the breeds likely to arrive soonest at maturity. The pure short-horned breed, selected with care and expense from the stocks of the Messrs. Collins and other celebrated breeders, have long been used here, and on the best description of soils, with success. Various crosses have also been often tried between the short-horned and other breeds, and the result in general has been favorable for the first cross. The second cross produces here by no means so good an animal as the first. The cross between the short-horned and highland breeds produces a very good animal, with every tendency to feed, but of a nature almost as wild and untameable (and sometimes more so) as its highland progenitors. The cross between the short-horned and Ayrshire breeds produces a very good animal, generally well suited for dairy purposes. The cross between the short-horned and polled Galloway breed produces a very excellent animal, possessing, in a great measure, the feeding qualities and best points of the short-horn, and the hardiness and docility of the Galloway cattle. On good lands, this cross is here preferred to any other stock. The pure short-horned cattle are found, after many years' experience, to be rather too tender for the climate, and difficult and expensive to winter.

Galloway cattle are the general stock of the district. They possess many advantages, as they can at any time be brought to market. Their hardy and very healthy habits fit them well for the climate and soils of Cumberland; and although the first cross with the short-horn does produce a good beast, no good breeder would choose to continue his stock from these crosses. Thirty of the best West Highland heifers, and four-score aged Highland black-faced wedders for the family use, along with the Galloway cattle, form the permanent stock on these lands. But from their extent, it is impossible to winter as many cattle as the grounds can summer; and therefore in April and May yearly, a flying stock of cattle, chiefly Galloways and West Highland heifers, are purchased in the local markets on their journey southward, and fed off on these pastures; and it is the custom to have an annual public sale of this flying stock. They are sold in lots, and are generally bought by cattle dealers and butchers. The greatest number are resold again at the great fair of Broughhill in Westmoreland, on the 1st of October. Thus the pastures are completely eased at the proper season, and left rough for the wintering stock, and about this period all accounts are settled, the remaining stocks, crops, &c. valued, and the profits or loss on the whole concern annually struck.

Sheep.—Except the black-faced stock already mentioned, as kept for the consumption of the family, no other sheep are kept, for it has been found that cattle pay much better; pure Leicester and South Downs have been kept as breeding stocks, as well as Cheviot and half-bred sheep, but the result has been to abandon a breeding stock of sheep entirely.

Lambs.—The breeding of lambs for sale to the butcher, has never been followed here, but breeding for a stock has been. The ewes have in every case lambed in the open pastures, and little or no loss has ever ensued from the practice.

In extensive stocks, it is impossible to protect the ewes in the lambing season, from the fall of rain or snow. In very small stocks, sheds for sheep may answer a very good purpose, but it has never been found necessary to provide such protection here. Folding ewes in a confined place in the lambing season, is decidedly an improper mode, and is never practised in this country.

The sheep commonly grazed in the district are the Cheviot breed, but probably the most profitable is the half-bred or cross, between the pure Leicester, and the pure Cheviot; for these possess the stamina or hardy constitution of the Cheviot, with the docile and gentle nature and feeding qualities of the Leicester breed, while the wool is improved by the cross. Sheep are seldom laid with tar and butter on these grounds, but otherwise every thing that can conduce to their health and comfort is attended to by a careful person who manages the stock.

Horses.—The farm horses in greatest repute in this district are the rough-legged Clydesdale or Lanarkshire breed. In this establishment, these and the Cleveland horses are generally used. The preference in the reporter's opinion is due to the Cleveland breed, for they are more quick in their movements, and consequently better adapted to light soils than the Clydesdale, which breed, however, is admirably adapted to heavy soils, and are remarkably quiet, and generally possess good constitutions.

Pigs.—This particular district produces great quantities of bacon and hams for the London and Liverpool markets, and the breed of pigs is in consequence a point much attended to. There are different breeds here, but the kind preferred in this establishment is what are provincially called the "prick ears," a well made, short-legged animal of its kind, of a yellowish-white color, averaging, when quite fat, sixteen or seventeen stone of fourteen pounds each. This variety seems of a remarkably sound constitution, and is generally fed off at from twelve to fifteen months old. In this district pigs are allowed a range of pasture, with food in their piggery at regular intervals, and they thrive remarkably when so managed. On this farm, however, they are only allowed the range of the straw-yards. They consume the refuse from the kitchen, aided by potatoes, &c. steamed for their use, and they have always yielded a very fair return.

Management.—Cleanliness, as well in making ready the food as in the piggery, is essentially ne-

cessary to promote the health of the animal, and fresh beds of clean straw are regularly given them. A steaming apparatus on the most approved principles for preparing the food of the horses, dairy cows and pigs, has always been used here, and ought to be used on every large farm, but attention should be paid not to give any food more than lukewarm to any stock.

IMPLEMENTS.

Ploughs.—Iron ploughs only are used. The first of the kind was manufactured by Wilkie, of Uddingstone, near Glasgow, but these implements are now regularly made on the best construction, by tradesmen in the neighborhood. They are uniformly drawn by two horses abreast only, and with such ploughs and horses, any kind of soil may be well cultivated. The furrow-cutting plough, described under the head of grass husbandry, may be made by any plough-wright, and is a most useful implement. The number of horses employed in drawing it, depends on the depth of the furrow, and the nature of the soil.

Carts.—Carts with iron axles and two shafts, as commonly used in Lanarkshire, drawn by a single horse, are decidedly the best, and no other kind is used here. In harvest and hay-making, a frame is mounted on the shelvings of such carts for bringing the crops from the fields.

Harrows.—Finlayson's patent harrow is greatly used here for cleaning lands. It is a very useful and excellent implement for such purposes. The common seed harrows are in use on this farm; some of these are made of iron.

Drill Machines.—A machine for sowing turnips by two drills at once is used here, and another machine mounted on a small wheel, and pushed by a man, for sowing grass and clover seeds, is also in use.

Threshing and cleaning the Grain.—At first for many years this was done by a threshing machine driven by horses—latterly, it is altogether done by hand labor and by the flail, and paid for by the bushel of cleaned grain. The expense is probably as cheap by the flail as by the machine, and employment is thus given to the poor, and every purpose required is answered by the present practice.*

MANURE.

No part of rural economy is less understood or attended to than the management of manure; and it would require a treatise on the subject to detail the systems pursued in the best farmed Scotch districts, which are always held as the guide for good management here. It may be shortly stated that all the urine from the stables, yards, cow-houses, piggeries, &c. is carefully conducted by under drains into the dung-pits. The dung collected is carted out during the winter for turnips, and laid up in convenient places for a speedy application to the lands, the instant the season suits for sowing. The middens, or dung-hills, in the fields, are hollowed out in the bottoms, so as to prevent the moisture from escaping, and are regularly covered with mould. The carts are never allowed to pass along the dung-heaps. The manure made in summer, when cattle get green food in the house, is always of better quality than winter-made dung, and is generally applied to the summer fallows. Short dung is unquestionably most suitable for turnips, as in that state it affords no interruption to the plough and drill. Long dung, that is to say, dung not fermented, may be applied to potatoes without any impropriety. The management of compost occupies considerable attention; frequent turnings, and probably twelve months are required to reduce the stubborn lumps of clay often used in the making compost, and turnips are in many cases raised by no other application.

GENERAL CHARACTER OF THE DISTRICT.

The estate, of which the lands here described form a part, consists of an extensive district, in which there is a very considerable quantity of good loamy clay and gravelly soils on the rivers, but by far the greatest portion is clay soil. Horses are regularly bred by almost every farmer, and the dairy husbandry (chiefly in the making of butter) is largely followed. Every person produces a certain number of young cattle as well as fat beasts for market, and large quantities of pork and bacon are produced, besides considerable quantities of wheat, barley, oats and turnips. In this district, where a mixed system of husbandry is followed, from the necessity of attending markets, and from having a considerable intercourse with strangers, the farmers are sharp clear-sighted people, alive and ready to adopt any successful experiment, *after it has succeeded under the proprietor's management.* On this estate, a local farmer society, confined to its bounds, but having three hundred members, has long existed, by whom prizes are yearly awarded to every branch of good management in agricultural matters, and to the various descriptions of stock. The yeomanry thus meet regularly once a year; they hear the management of their farms discussed openly and freely; good managers are praised and rewarded, and indolence and bad management would be ashamed to exhibit themselves. All the good stock of the country is annually shown, and the spirit of emulation is invariably attended with good consequences at the next meeting.

The country is purely agricultural. No man is above his profession, and almost all are possessed of means fully equal to managing their lands in the best style. The country is now enclosed and subdivided into suitably sized fields. Quick hedges of thorn, kept neatly dressed by the pruning knife, are the common fence of the country, and few countries can boast of better hedges than this.

Except along the sides of the great roads, hedge-row trees are not usually seen or planted, and the country where grain is chiefly produced, has been purposely and judiciously left open, to admit a free current of air and sun to the crops, a point of much consequence in bad seasons, and in a climate as damp as this is. This district lies low. It extends from the head of the Solway Frith, rising from the level of the sea, with a very

---

*The experience of every other district of the kingdom is contrary to this conclusion. The machine threshes much more cleanly, and it is equally beneficial to the consumer and the farmer, from the facility with which it enables the latter to meet all the changes and exigencies of the market.

gentle general rise for twelve miles, to an altitude of about five or six hundred feet. The district is not subject to any epidemical disease. The people are temperate in their habits, and often attain a great age: pulmonary consumption, however, frequently makes its appearance, particularly in the vales descending towards this open country; and numbers of the youth of both sexes are cut off by this fatal malady.

PLANTING.

The management of plantations is probably foreign to the common operations of the farmer, but the shelter which they afford, render them at all times, and especially in an open district, objects of great moment even to him. Hundreds of acres have been planted on this estate, and the general success has been cheering. Trenching by the spade has never been done here preparatory to planting timber, the scale on which planting has been conducted being far too large to be managed in this way, but the lands have in every case been laid dry by open drains, and in some cases (particularly in planting land covered with short ling) the ground has been ploughed before planting by a plough drawn by four horses. For the first three years, the young trees have not grown so luxuriantly as might be desired, but in the fourth year, and afterwards, they push out vigorously. In every case care has been taken to plant hardwood trees of oak and ash, &c., and at such spaces that they may ultimately become the standard trees; and larch and Scotch fir are, in the meantime, planted as nurses, to be removed according to the necessity of the case. Every variety of tree thrives well on this property, but more particularly on the loamy soils.

CAPITAL AND ACCOUNTS.

Without an adequate capital, good farming cannot be followed. This, however, though a point of first consequence, we fear is often too little considered by the young farmer, and probably by the proprietor in letting his lands. Before letting lands, the proprietor or his agent should, if possible, be thoroughly acquainted with the farmer's means and capital, as well as his general habits and disposition; and if this is insisted on, it will prevent, in many cases, tenants of inadequate capital and bad character from obtaining leases.

Few, or almost no farmers, keep *regular* accounts, and the consequence is they are often in the dark as to the true state of their affairs. A system sufficiently simple and concise might be easily contrived to answer all the ends in view; but, from prejudice or want of habit, it is to be feared the general run of farmers dispense with the keeping regular accounts.

Laborers.—Laborers are easily obtained here, either for piece-work or by the day. Their wages by the day are generally 1*s.* 4*d.* to 1*s.* 6*d.* in summer, and 1*s.* 2*d.* to 1*s.* 4*d.* in winter. These men are bred from infancy to all kinds of agricultural labor, and are generally expert in the use of the spade, scythe, &c. The real good farming laborer here cannot, with justice, be said to be in distress, for he always finds employment; and in this district the laborer has advantages unusual in some other parts of the country. For instance, his fuel costs only his own labor in cutting and preparing the peat; he, in every case, keeps a pig, and sometimes two; and the manure, ashes, &c. his pigs and cottage produce, are readily laid on by the farmers on their fallows for the cottager, who receives one crop of potatoes from his own manure. The great evil is early marriages: young men generally marry before they are twenty, and the females much sooner, and the alarming extent to which bastardy has increased in the country is a most serious evil. No laborers in these parishes possess any little property, such as a cottage and garden of their own. The poor-rates have not increased here for eleven years past, and the county rates are rather less now than at that period. The farm laborers are generally well behaved, cheerful, and obliging; and it is very rare indeed that any of that class ever appear to solicit aid from the parish vestries.

POOR-LAWS.

The lands described are situated in two parishes. The management of the poor-rates is conducted in each parish by a select vestry, under Mr. Sturges Bourne's Act, the rector of the parish acting as chairman. The poor, (chiefly the aged and infirm, and the hand-loom weavers of Longtown, and some small villages in the neighborhood,) have their various cases heard and relieved, and if ever there is an appeal from these vestries to the local magistracy, the case of the applicant is fairly and properly inquired into, and suitable relief afforded. Indeed, there is an evident wish among all parties to do what is fair and just to the poor. The presence of the clergyman in these vestries, however, has no doubt had a great influence in checking any thing improper on the part of the members of vestries.

Assistant Overseer.—Each parish has an assistant overseer, who, besides a regular salary, receives ten per cent. on all moneys he may recover from the fathers of illegitimate children. This is a point of much consequence, for, from the local situation of the district, divided from Scotland by an ideal line, the fathers of such children, from either side of the border, easily escape from the maintenance of their progeny if they are so disposed. These overseers are thoroughly acquainted with their profession, are respectable in their way, have a perfect knowledge of the paupers, and are exceedingly useful in keeping down the poor-rates and seeing the funds properly applied.

CHARACTER OF THE PEASANTRY.

As already remarked, the peasantry are generally civil and obliging in their dispositions, and grateful for the good treatment and kind words they may receive from their masters. It is a truth which constantly strikes the reporter's observation, that however illiterate they may be themselves, the peasants strain every nerve, and often deny themselves many little comforts, in order that their scanty funds may be saved to get their children decent education at the parish schools. It is no uncommon thing for laborers to continue in one master's employment many years, and on this farm of Netherby all the servants have been in their present service for a long period, although their engagements are only from week to week.

Parish schools.—In these two parishes, there are eight endowed schools, at which all the use-

ful braches of common education are taught by schoolmasters appointed by the rector of the parishes: these schools deserve, and do receive every support from all classes of society here, and are indeed a blessing to the country. The many thriving and wealthy merchants and tradesmen of respectability, natives of this district, now settled in London and elsewhere, fully prove the good effects of educating the lower orders, and the example of the good character and the enterprise of the young who leave the district, acts as a spur to push on those left at home to emulation and good conduct.

Means of improving the condition of the peasantry.—Ploughmen cannot be employed by the piece,* but a great portion of agricultural labor may be so done. It has long been the practice on this farm to let every thing possible by the piece, as a matter of justice and propriety, both to the employer and his laborers. This is a most encouraging plan to the industrious peasant, who thus secures the fair return for his labor. Jobs are always let by estimate, but the competition, though fair, is never so very keen as to reduce the prices given too low.

Medical aid.—The family surgeon attends the whole permanent servants of the establishment in cases of bad health, and he receives a regular allowance for his services.

Gardens.—All the permanent servants have small gardens, well kept. These patches are a source of great comfort to the possessor, and a rational amusement at his leisure hours. A few of the ploughmen are allowed to keep a cow each, on paying a very moderate rent for the pasture through summer.

Separate dwellings.—The dwellings of the laborer ought undoubtedly to be separate from each other. This, however, unluckily, is not the case here, for all the permanent servants live under one roof in a large three-story building erected many years ago, near the farm-yard. These people are all respectable in their way, but huddled together as they are, it is not possible to prevent little quarrels and bickerings from breaking out occasionally, where people with families (although each has two separate rooms,) are so congregated. It is in contemplation to remedy this mistake, by erecting separate cottages for the servants.

Residence of the proprietors.—In this district one great proprietor owns the whole, whose residence is constant.

Marriage.—There can be no reason why the laborer should not marry, except that they are too ready to enter into that state when very young, and before they have saved a little money to begin the world with; though as yet, the excess of the agricultural population is not felt as a serious burden in this district, for the country is making rapid strides in improvement, and all good hands find at present ready employment.

Believing that details of real practice are of more use to the cause of rural improvement than theoretical opinions, unsupported by the test of experience, the reporter has confined his observations, as closely as possible, to giving an accurate account of the management of a gentleman's park and farm on a large scale; and he has only further to say, that the profits or returns have been always fair, and such as completely to warrant a communication of the systems pursued.

Glinger Bank, Longtown,
19*th July*, 1830.

*But for that reason are paid at a higher rate of wages than the ordinary day-laborer.

For the Farmers' Register.

THE MORALS OF MANURING.

Bad health is a good excuse for most of the negligences of man; and it is with grief that I offer you this for not communicating with you more freely. Little now remains to me in life more dear than to give my young friends the benefit of my experience, and show them how to make themselves prosperous, abundant, and happy. Holding, as I do, that the moral power of every community depends upon the facility of man's obtaining subsistence, I assume as undeniable, that he who teaches how ten grains of corn and as many blades of grass can be grown where now but one can be shown, in that very proportion increases the moral power of society. In plain disrobed English, I hold that our duty to Mother Earth is the basis of moral law and moral duty; and disguise it as you may, the facts which sustain me are abroad and "trumpet-tongued." Neglect of this duty has created the necessity of legislating society to death, or into deep disease; but this is mere quackery. Loco-focoism is marking and banding its party, and in the fulness of time it will produce the madness of battle, and, like that of the cats of Kilkenny, nothing but the tails of the combatants will be left. Man is strictly and purely selfish; and he is nothing loath to seek his self-gratifications at every hazard deemed compatible with his safety, or his *probable* safety; else why your court-houses, jails, whipping-posts and penitentiaries? not forgetting that summary contrivance with which Haman was wont to remove Mordecai from the king's gate? Disguise it as you may, neglect of duty to dear old Mother Earth, to "till and dress her" faithfully, has hatched and now feeds those necessary Vampyres. Nor is this all. Look back upon the whole history of man, and hatred of labor and self-gratification are his ruling passions. He has not always been cannibal; but let self-gratification make it necessary, and he has been ever found ready to take the blood of his fellow, or make him his servant. If, in the beginning, Moses had taught that to "till the earth and dress it" was a paramount duty, divers other commandments would never have been broken. True it is that he did say "whosoever sheddeth man's blood, of him shall blood be required;" and yet we learn that more than ten times the number now living have been slain for the gratification of the selfish purposes of others. If it be the duty of man to till the earth and dress it, and we show him how much self-gratification he will have in the result, surely, though we preach of the resurrection of dead land, we may be heard; for this is the great panacea of church and state. First let the land be made perfectly dry, and lay upon it 50 or 100 bushels of shell or stone lime to the acre, let it lay three months if possible before you plough it for corn, (a shorter time will do,) then harrow down well to close the cracks, and plant in checks or

straight lines as may suit the cultivators' fancy, this done coulter the land well, clean the corn with the hoe as soon as it is large enough, passing the cultivator as many as three times in a row five or five and a half feet wide; this keeps the land light and free to the roots of the growing plants, and saves the evaporation of the volatile fertility of the earth; in this way a single horse will well cultivate as much land as will make 100 barrels of corn. For fallow, lime your land in the same manner, and turn it well in May and June, and harrow it down close. After your wheat is thrashed and delivered, throw your land in the desired shape, and keep it clean until seeding time. My life for it, there will be no mistakes; nature never makes any; it is the lazy man who mistakes, and finally cheats himself. I now have a most beautiful field of 100 acres thus prepared, and I am deceived if it be not equal to two crops of clover lay. Let me be understood fully; I take it as granted that every farmer, or every man pretending to be a farmer, makes and applies all the manure he can, his farm affords him a great mass of material, and if he will add to this all the rich earth he can collect, mixing the same with lime, I doubt not he will soon begin to doubt whether he is upon his own miserable tattered estate. I seed my land in clover in February. I think, sir, if I could take you over my fields, you would agree that I was in a fair way to carry out my premises. Court-houses, jails, and penitentiaries, you would see in imagination going into dilapidation, and the very church superseded in half of its moral labors. For why denounce vices that have ceased to exist? Who would practice "coward deceit and ruffian violence," if not urged on by want and envy? From Canada to Mexico we have but one cry, and that is, "stand by your party." If, sir, our fields were covered with abundance, who would dare to raise that cry? Who would dare to raise any cry unfriendly to our beloved country? Where would the wretch hide himself who would dare to declare that "to the victors belong the spoils?" I am no politician, sir, but I stand by my country, and her would I have covered with abundance.

Before I close this, let me say a few words about manure. It is the bread and meat and the money-power of the farmer; without it, he is a poor fellow. Let him therefore keep in mind that as it is his only active capital, his dividends of profits *must* depend upon it. Let him therefore at all opportunities cover his farm-yard with rich earth, and over that apply a good coat of lime; upon this pen his cattle, and so go on through the year, and the quantity he will make will surprise him. If possible let him apply it as surface dressing upon grain or grass; but apply it as he may, it is productive power. Let his motto be "my duty to Mother Earth," and my life for it, dear old Virginia is once more great, patriotic, abundant and happy. Let me say to you, Mr. Editor, that you have no cause to despair; you are acting upon that great and absorbing principle in man, self-love, and you cannot fail.

I bid you farewell, in the name of dear old Mother Earth, whose kindness is only limited by our own acts.

LIME.

Fairfax County, 6th May, 1838.

Extract from the British Farmers' Magazine for April, 1838.

RELATION OF SOILS TO MANURES.

There is an essential difference between sands and sandy loams; the former are greedy of manure, and being almost purely silicious, they decompose it rapidly, and relapse into their original poverty; but loams, though composed of little more than one-tenth of fine aluminous and cretaceous matter, with nine-tenths of silex tinted by oxyd of iron, retain and fix manures; they are pulverizable, reducible to ash fineness, yet cannot be deprived of manure otherwise than by the attractive energy of a vegetable crop. Thus, to borrow the excellent description given of a *naturally* good and rich soil, by an American agricultural chemist:—"After being exhausted by cultivation they will recover their productive power by merely being left to rest for a sufficient time, and receiving the manure made by nature of the weeds and other plants, that grow and die upon the land. * * * The better a soil was at first, the sooner it will recover by these means, or by artificial manuring."

There is one fact which cannot be too strongly impressed upon the purchasers or renters of arable and pasture land, it is this:—that, be the natural quality of the staple what it may, it remains permanently the same! Poor, beggarly land may be glutted with manure, but *that* is evanescent: the more hungry the native earth, the more speedily will it become exhausted. By parity of reason, it may be shown, that *rich land* may be deprived of its decomposable manures, and by a wretched parsimonious management can be prevented from exerting its decomposing powers,—that is, it may be rendered inert and idle, but its native inherent worth can never be depreciated, and hence he who purchases good and sound land, embarks his property on a venture which must be prosperous, if he act upon the principles of a liberal philosophy, which will teach him that *the decomposition of putrescent manures in soil* is brought *about by a mutual energy exerted between the vital principle of the roots*, and the staple *undecomposable native* earths. This energy is not remote from that of the galvanic battery; and when we become more conversant with the powers of electricity and magnetism, we shall feel ourselves proportionally enlightened upon the points, now involved in mystery, connected with the laboration of vegetable aliment. My own mind is satisfied thereon; but, in the absence of incontrovertible evidence, we must wait the progress of further discoveries.

From the British Farmers' Magazine.

USE OF FISH MANURE IN ENGLAND.

The fish which are usually employed as manures, are, 1st, sprats; 2dly, pilchards; 3dly, herrings; 4thly, sticklebacks; 5thly, whale blubber. These are very rich fertilizers; the fleshy or muscular portions abounding in oil. The scales are composed of coagulated albumen and phosphate of lime; the bones are full of oil, and their solid portion is composed of phosphate of lime and carbonate of lime, in different proportions.

Sprats.—In the counties of Essex, Kent, and Suffolk, the use of this manure is very general, although the practice is not of very long standing. The quantity applied per acre varies from 25 to 45 bushels, the poor gravelly soils requiring more than the loamy lands.

They are actually spread by hand, and on winter fallows intended for oats, of which, especially if the summer is not too dry, it produces most luxuriant crops, of a peculiar dark green color, yielding ten or eleven quarters per acre, and that on land of a very second-rate description. The effect of the application, however, remains only for one crop. They produce an equally good result if mixed with earth and suffered to remain and dissolve, for some time, in the heap, before they are carted on the land. In this way they answer exceedingly well for turnips. They are usually obtainable at the rate of from sixpence to eightpence per bushel.

The extent to which this manure is used may be judged by that of the Stow-boat fishery, which is solely devoted to catching fish. Upon this fishery the committee of the House of Commons of the session of 1833 thus reported—

"This fishery, which prevails principally upon the Kentish, Norfolk, and Essex coasts, has been proved to your committee, to occasion very extensive injury to the spawn and brood of fish. The nets used in it are of a very fine description, so small as not to let a pen pass through, and they enclose not only sprats, but the spawn and young brood of all other kinds of fish, and as these nets are frequently drawn along the ground, and in shallow waters during the breeding season, and in the winter months before the young fish are gone into deeper waters, an immense destruction of the spawn and breed of fish is the inevitable consequence; whilst from the almost unlimited demand for this species of manure for land, and there being a ready sale for all that can be procured, this branch of fishing has greatly increased; and there are at present from four to five hundred boats engaged in Stow-boating on the Kentish coast only, which remain upon the fishing grounds frequently for a week together, not for the purpose of catching sprats or any other fish to be sold as food in the market, but until they have obtained full cargoes of dead fish for the purpose of manuring the land."

The farmers of Essex and Suffolk purchase these fish by thousands of bushels at a time, and carry them in wagons ten or fifteen miles into the inland districts.

Pilchards are extensively employed in Cornwall and Devonshire, both in the fresh and in the salted state. The pilchard is a small fish not larger than a herring; it visits part of the coast of Cornwall and Devon in large shoals, during the months of August and September, and again in November or December.

The refuse fish, which are those principally used by the cultivator, are usually mixed with earth, sea-sand, sea-weed, or some other substance, to prevent them from causing too rank a growth. The effects of these pilchards, according to Sir H. Davy, are apparent for several years.

The pilchard is a very oily fish, and may be had in almost inexhaustible quantities. Between eight and nine thousand persons, at sea and on shore, are employed in this fishery, and about 30,000 hogsheads are annually exported either to the West Indies or the Mediterranean.

The Herring.—The employment of this valuable fish for the purpose of manuring the ground is limited to those districts near the sea, to which the shoals of herrings are regularly visitors, and even there, their use is confined to those seasons in which there is an unusual glut, as occasionally happens on the coasts of Scotland and the eastern side of England. They are a very oily fish, and produce the same rank luxuriance of growth as sprats or pilchards.

The celebrated Arthur Young has given us an account of an experiment, in which some wheat, manured with these fish, grew so luxuriantly that it was entirely laid before the period of harvest.

Very numerous or accurate comparative experiments with this fish can hardly be expected, for its use must necessarily be confined to peculiar districts; and when obtained, it is generally ploughed in with considerable expedition, or dug into earth heaps, which is a mode found to answer extremely well.

Sticklebacks.—The use of the stickleback is principally confined to the neighborhood of the Fens of Lincolnshire and Cambridge, in which it breeds with great rapidity, and in whose shallow waters they are caught at certain seasons, specially as an article for manure. They are used in much the same proportions, either by themselves or mixed with earth, &c., as sprats, and are not more durable in their good effects.

The fat or blubber of the whale.—Whale blubber was employed by the late Lord Somerville, at his farm at Fairmile, in Surry, as a manure, and produced the richest crops. Its general high price, however, rarely admits of its employment by the farmer. It was mixed with the sandy earth, and suffered to dissolve in the heap. It cost, at the wharf in London, 20s., and, with the expenses of carriage, cost his lordship about £2 per ton. It answered equally well upon arable and pasture lands, producing most luxuriant crops; and its good effects were visible for two or three years.

Whale blubber is composed principally of train oil and other animal matters; but the oil is by far the largest portion of the blubber; and to the presence of this fish oil, which does not appear to differ materially in composition, from whatever fish it is obtained, must be attributed the chief fertilizing value of all fish.

Train oil has been analyzed by Dr. Thomson. He found in 100 parts—

Carbon	- -	68.87
Hydrogen	- -	16.10
Oxygen	- -	15.03
		100.00

Spermaceti oil, according to Dr. Ure, contains in 100 parts—

Carbon	- -	78.00
Hydrogen	- -	11.80
Oxygen	- -	10.20
		100.00

Fish oils, therefore, are composed of exactly the same substances that constitute almost all vegetable substances, differing only in the proportions for sugar, starch, gluten, gum, &c., &c., which are all composed of these three substances —carbon, hydrogen, and oxygen; blubber, there-

fore, may be regarded as the most condensed manure that it is possible to apply to a soil: it contains little, if any, water, and every portion of it is a food for plants.

The same remarks will apply to the dregs of train oil, &c., which are sometimes applied; mixed with earth, to the same purpose; but it is seldom that these substances can be procured in any quantity, at a sufficiently reasonable rate.

Some farmers may possibly doubt the correctness of my assertion, that all the principal vegetable substances are composed of precisely the same ingredients as oil and other purely animal matters; and as it is of the first importance that the cultivator should clearly understand the reason why the decomposition of animal matters furnishes such admirable food for vegetation, I must beg of him to compare the analysis of the oils which I have already stated with that of the following common vegetable substances, as ascertained by the most careful analysis; and, not to be tedious, I will merely give that of three substances:—

1. Sugar, 100 parts of which are composed of—

Oxygen	51½	parts.
Carbon	41½	"
Hydrogen	7	"
	100	

2. In 100 parts of starch from wheat flour are found—

Oxygen	49½	parts.
Carbon	43½	"
Hydrogen	7	"
	100	

3. The wood of oak is composed of—

Oxygen	42¼	parts.
Carbon	52	"
Hydrogen	5¾	"
	100	

All oily and other animal substances, therefore, as they putrefy in the soil, are slowly converted into those gaseous substances which are the food or breath of vegetable life, such as carbonic acid, gas (fixed air) or carbonated hydrogen (the gas employed for illumination), and which are absorbed either by the roots or the leaves of the plant as they are formed. There is little or no waste, in these, for when the decomposition of the oils and fibrous matters of fish is finished, there is very little or no earthy or solid matter remaining, unless in the soil. In this, again, the experience of the farmer substantiates the chemist's doctrines, for he uniformly tells us in answer to our inquiries, that "the fish only last for one crop."

In the east of England the farmers of the soils conveniently situated for water carriage employ to a very considerable extent as manure several kinds of fish besides sprats, such as five fingers, cockles, muscles, &c., and this use is only limited by the supply, or what is commonly a more important impediment, the difficulty of transporting them any distance while sufficiently fresh.

When once the fish begin to putrefy, their fertilizing properties rapidly diminish; the oil from the fermenting sprats I have seen dripping from the wagons as they travelled along; thus they speedily lose in weight, and become intolerably obnoxious to the district through which they pass; several convictions have, indeed, taken place among my neighbors in Essex, for carrying putrefying fish through towns and populous villages.

This is hardly a matter of astonishment, since the farmer who has to convey a freight of several hundred bushels of sprats, perhaps ten or twelve miles, has often much too little time allowed him for that purpose. The fish perhaps arrive stale. Is a load detained by contrary winds, or prevented by circumstances from reaching another destination, the farmer has to be informed of their arrival, cannot despatch his teams as speedily as the nature of the case requires, the fish become offensive, and his ardor for the improvement of his land is checked by a magistrate's summons and a conviction for a nuisance. These are the reasons which retard the use of these kinds of fish as manure, but cannot entirely prevent their being employed. Their use is still, in spite of all impediments, annually increasing, especially in the neighborhood of those places to which the fishing smacks find a ready access.

By the general formation of railroads, the cultivator even of the inland soils of England will have all these valuable sources of improvement offered for his service—fertilizers of even national interest, since they are drawn from an inexhaustible source, afford employment to a branch of industry invaluable in a maritime point of view, as a nursery for seamen, and have, moreover, this great and paramount advantage, that they add to the permanent riches of the land, and are not, as is the case with other fertilizers, drawn from one district of the state to enrich another. There need be no fear of the supply not keeping pace with the demand, for the ocean is inexhaustibly tenanted with fish. As fresh agricultural markets arise and are satisfied bythe railways, fresh sources of supply will be discovered, other coasts explored, and increased fisheries established.

From Miseries and Beauties of Ireland.

THE PRICE OF RENTS, AND OF THE TENANTS' "GOOD WILL" IN IRELAND.

"The circumstance that would strike an Englishman as most remarkable on first investigating the agriculture of Ireland, is the enormous price given for the tenant-right or good-will of a farm, in addition to a full and sufficient rent. Ten pounds per Irish acre is no unusual price. This cripples the farmer, and keeps him in debt as long as he lives. Nor is the practice confined to farms held under lease; those held from year to year are purchased; and, if belonging to a kind landlord, fetch nearly as much as those held on lease, though the tenant is liable to be turned off whenever the landlord chooses. Such is the confiding disposition of these people, when the conduct of the landlord, whatever be his politics or religion, is regulated by honorable principles. This confidence in their superiors is one amongst many proofs of the docility of the Irish people, and the ease with which they may be governed. I was anxious to ascertain how these farmers, always poor and in debt, could possibly raise the money to buy the farms. This I never got satisfactorily answered, and I believe they scarcely know. Some

go to England and earn money by trading, shearing, and other work. They borrow the greatest part by becoming sureties for each other; in this they exhibit great kindness. Under this system of paying tenant-right, the landlord has always security for his rent, even supposing the stock to be driven off, because he would take advantage of the property which the tenant had in the farm, and the new tenant always pays the arrears of rent, the balance only being paid to the off-going tenant. It has also naturally induced the tenant to consider that he has a beneficial interest in the farm; the practice, by long usage having assumed the character of a right—so much so, indeed, that in some places, (the county of Donegal, for instance,) a tenant, I am told, sells his interest in his farm in spite of his landlord. A father leaves it by will to his children, or gives it whenever he pleases, and it passes by will like real property. This may account for the peculiar hardships the people feel, and the way in which they prosecute their revenge against the landlord, or his steward, and the incoming tenant. In many parts of Ireland the difficulty consists not so much in dispossessing the present tenant, as in securing peaceable possession for his successor."—Vol. i, pp. 84—86.

"Small farmers pay their rent in money; laborers generally in labor. The competition for small holdings, single acres, &c., causes the tenantry to bid any thing in order to get in. 'If a farm of five or ten acres,' said Thomas Rogan, 'were vacant in the barony, there would be dozens of bidders for it.' This witness occupied a farm of three acres and three roods Irish, for some of which he paid £1 5*s.* per acre, and for more of it £3. 'If you were going away,' he was asked, 'what would you expect for the land?' 'I dont think I'd leave it under £60 or £70,' was his answer. Mr. Trotter, one of the witnesses, had known £170 to be given for a farm of Lord Downshire's, at Ballykanly. The land was six acres, at a rent of £2. 2*s.* per acre; this value was set upon it, not because it was building ground—it was a common farm. The same witness stated a case where £100 per acre was given for six acres (Irish measure) paying 10*s.* 6*d.* an acre rent; this, however, was in the war time.

"When the tenant gets a year or two in arrear, the landlord, instead of ejecting him, allows him to sell his 'good will,' on condition that so much of the purchase-money as will clear the arrear be given to himself. Of those thus got rid of, some, said Mr. Gracey, go to America; but the majority repair to towns with the remainder of the money, and set up business—generally a public-house. It did not appear from any of the witnesses that a single penny of rents is reduced in case of a hard year; and yet it seemed that the anxiety to obtain land, even at a high rent, increases, as the means of paying the rent diminishes. From all that could be ascertained, the farmers now give every thing towards the rent, except a bare subsistence. 'People, in fact, are mad after land, and in the bargains respecting it, the landlord is sure to be on the winning side.' It was stated however, that Lord Bangor, in letting some ground lately, refused the rents that were offered. He sent out his valuator, and though several offered considerably above the valuation, his lordship did not accept of any advance upon it. The witness who furnished this information stated also, that rents in general were increasing; that the average in the vicinity of Strangford was about 25*s.* per Irish acre; the cess 4*s.* per acre; and the tithe, 2*s.* 6*d.*

"The average extent of farms is about twenty acres Irish; there are very few exceeding one hundred acres. The size of the holdings has rather increased than otherwise. According to the statement of Lieutenant Martin, there is only one dairy farm properly so called, in the barony. Those proprietors who have attempted to enlarge their farms have incurred considerable odium; the farmers would as soon part with their lives as with their farms. When a man is in arrear, the landlord causes him to sell his farm, and is anxious that some adjoining farmers should purchase: this was stated to be the usual course. 'I myself,' said one of the witnesses, 'commenced the world on seven acres, but by hard labor and care I have purchased up to forty-one now.' 'One of my neighbors,' said Mr. Gracey, 'began on nine acres, and by strong industry he has purchased £600 worth of land.' All the farmers agreed that if a farm of fifty acres were divided into five farms, more would be produced than if the whole were in the occupation of one man: more care and labor can be devoted to it. There is a wonderful competition for farms of all sizes, of which Captain Saunders gave us an instance. 'A tenant of Major Beauclerk's,' said he, 'some time ago bought ten acres in addition to his own farm of forty, at a very high rate. I told him at the time it would be his ruin, because he had to borrow some of the purchase-money; and so it turned out. He came to me the other day, wanting to sell it again, in order to pay up his arrear: and what do you think he was offered for it? A neighboring tenant offered £200 for his 'good will;' for the ten Irish acres are out of lease. But I refused to permit the bargain to be completed, knowing that it would only break the other man, inasmuch as he also would have to borrow most of the purchase-money. I only consented to the sale on condition that the purchase-money should not exceed £50. The ten acres paid a rent of £2 2*s.* an acre.'"—Vol. i, pp. 113—118.

Extract from the Rev. H. Colman's Report on Spring Wheat.

MANURES FOR WHEAT.

Land among us can seldom be found too rich for wheat; but the enriching manures may be applied in too great quantities; or in an improper condition; or at an improper time. The feeding of plants is as imperfectly understood as the feeding of animals. As with animals, so with plants, we know that they cannot live without food, and their vigor and fruitfulness depend much upon the quantity and quality of their food. But how it is taken up, and by what means elaborated and distributed, remain as yet, in a great degree, among the deep secrets of nature.

Manures are of two kinds; putrescent, animal, or such as are supposed to furnish directly the food of plants; or active, such as excite either the organs of the plant to receive, or the powers of the earth to prepare, this food to be received, or by themselves educe from the substances, with

which they come in contact, the means of sustenance and growth for the vegetables to which they are applied. The former class consists of animal or vegetable substances in a state of putrescence or decay, the latter, of mineral substances capable by their action of rendering these vegetable and animal substances soluble and receivable.

I shall go little into any theory of vegetation or of the operation of manures. Many theories have been framed, but no one so demonstratively established, that none other can be substituted in its place, after farther inquiries shall have made us better acquainted with these mysterious but profoundly interesting operations of nature. Facts established by repeated experiments, are mainly to be relied upon. The application of green and unfermented manures has always been prejudicial to wheat crops. We know that the food of plants cannot be taken up unless it is reduced to extreme fineness or rendered soluble. This is applicable to all plants. If green and unfermented animal or putrescent manure be applied to wheat, it is always advisable to plough it in deeply, so as not to be reached by the roots of the plant until it has undergone some degree of decomposition. If, however, the manure be completely fermented and decomposed, it may then be safely applied, by being spread on the ground and harrowed in. It is desirable, however, in general, that the manure should be applied to the crop which precedes the wheat.

Lime.—The presence of lime in some degree in the soil, seems essential to the growth of wheat, and in a degree to the perfection of any plant. A very minute portion of lime is always found in the wheat plant. Some portion of lime likewise is found, it is believed, in all soils, excepting those composed entirely of decayed vegetable matter like peat, or of pure silex or sand.* In the most productive soils for wheat, lime is found in the form of a carbonate; and the permanent value of a soil for grain crops may be in a degree determined by the presence of lime. In Europe, the analysis of the best soils gives 25 to 30 per cent. of carbonate of lime.† We shall soon be favored with the analysis of the soils of our own state from our learned geological surveyor.

Lime is not however the food of plants. It is not a mere stimulus to the plant. The most reasonable theory is, that it causes the dissolution of other substances in the earth; and prepares them to become the food of plants, or to yield that substance which constitutes their food. As lime itself does not constitute the food of plants, this explains why lime alone does not enrich a poor soil; and why, where it has been applied in excess and without the addition of other manures, it for a time impoverishes a soil.

A new theory of vegetation has been suggested by some distinguished European philosophers, which professes to approach nearer to a solution of this great mystery than has yet been reached. "A new substance has been discovered in all soils and manures, which is denominated *humin* or *geine*. It has been found likewise in all barks; in saw-dust, starch, and sugar. Humin is a substance not unlike carbon, for which it has hitherto been mistaken. It combines with the salts and forms the humic acid. There is a strong analogy between humin and other nutritive substances, such as gum or fecula. It forms a humate with an alkali, which is very soluble in water. All substances which contain carbon, are dissolved in the water of vegetation through the means of humin; and the dissolved mass is taken up by plants as food. Humin in combination with lime, ammonia, or potass, also becomes soluble in soils or dung. Humic acid, and carbonic acid gas, mixed with water, according to this discovery, constitute the chief food of plants. Every description of manure is only valuable in proportion as it contains these substances."

Such is the modern theory of vegetation; which is in itself plausible, but which will be farther tested by the lights of chemical science; from which examination the best results to agriculture are to be expected. Lime causes the evolution or extraction of this matter from various substances. Potash leads to similar results, and with more power than lime and bone manure; and night soil and all animal manures are supposed to furnish humin or geine in abundance. In respect to night soil or human excrement, a discovery has been recently made in France, which promises valuable results. The charcoal procured from burning wood, peat, or coal in close vessels has been mixed with it in the form of a fine powder, which operates to disinfect it of all offensive odor; and reduce it to a powder, which is portable and may be easily distributed. I have seen this process perfecty effected in the course of an hour. Manures in a decomposed and fermented state, are said to supply this humic acid much more abundantly than in a crude or fresh state. In what precise condition they are best applied must be matter of farther inquiry and experiment; and depend somewhat on the mode of their application. If designed to be spread broad-cast and ploughed in, experience seems decidedly in favor of applying them in a green and unfermented state; but it is as well decided that green and unfermented manure should never be brought in immediate contact with the roots of a growing plant.

The rules for the application of lime to the soil, are of more immediate importance to the farmers than any further discussion of the theory of their operation.

Limes are found of various qualities from their different measures of combination with silicious, argillaceous, or magnesian earth. Magnesia is found combined with some of our limestones in considerable quantities, and when in great amount is deemed prejudicial to vegetation. The quality of our various limestones is of great importance; and this will soon be furnished to us by the highest authority. Lime may be applied to soils for two objects. The first to make a permanent change in the nature of the soil, as for example, to render a clayey soil less adhesive, and make it

---

* Which need not be stated as exceptions, as neither pure silex, or vegetable matter alone, deserves to be called "soil"—to constitute which more than one ingredient is always required.—Ed. Far. Reg.

† And in all our Atlantic States, not one acre in 100,000 has even one per cent. of carbonate of lime. Still Mr. C. is correct in saying that some small portion of lime is in every soil (properly so called)—and a larger proportion is as certainly a part of every *fertile* soil.—Ed. Far. Reg.

friable. In this case, a very abundant application would be required; and at the present prices of lime and of land, would be an experiment not likely to be undertaken by many of our farmers.

The second object is to afford immediate aid to vegetation. In this case, if we had means of reducing the limestone to a fine powder without calcination, it might at once be advantageously applied, and with permanent benefit. This has been done by an intelligent observer in West Stockbridge. He has obtained the ground stone in the form of a fine powder from the mills and shops for sawing and planing marble. The usual form in which lime is to be applied among us, is in a calcined state, and with a view to its immediate effects. In order to apply it advantageously, it must be either air-slaked, or slaked with water. It may be slaked with water in the field, and distributed immediately while warm; or mixed with mould, in the proportion of one bushel of lime to five of mould, and spread in that form; in which latter form it is, perhaps, more likely to be equally diffused. It may be mixed with peat earth; but in this case it should be allowed a considerable time for fermentation, in order to render the vegetable matter of peat soluble, and to extract from it the proper food of plants. But it must not be mixed with animal or putrescent manure. Its effects in such case are to destroy the animal matter, and leave only the woody fibre.

The effects of lime, whether applied in a caustic or an effete state, either air-slaked or water-slaked, are not very different. The heat imparted to the soil by its application when warm, would undoubtedly be to a degree beneficial. It should be applied on the surface of the soil, and merely harrowed in. It has a constant tendency to sink into the soil: and its operation is wanted in the vegetable mould, which is at the surface. In regard to the quantities to be applied, there are great diversities of practice. In England, upon soils comparatively destitute of calcareous matter, from 100 to 600 bushels have been applied; the last quantity, however, with injury to the land for some time. The English consider that 300 bushels are ordinarily a proper dressing for an acre, and this is applied at once; very much larger quantities have been applied, but the advantages of such copious liming are not always a compensation for the expense.

The French, and the Germans, of late especially, have been highly successful in the application of lime. The practice of the former differs from that of English agriculture; but its advantages have been fully tested. They recommend the application of about 12 bushels per year, annually, for three years in succession, or 40 bushels applied at a time once in five years. This is deemed ample. In this case is probably intended 12 bushels of unslaked lime, the bulk of which in the form of a hydrate, or slaked with water, is more than doubled. The plants on an acre will not take up a sixth of this quantity; but much of it is lost by gradually sinking into the soil, or goes to its permanent improvement. The French method rests upon the highest authority of science and actual experiment; and may be commended to our farmers.

Marls, which contain a good proportion of lime, are of great value in ameliorating soils; and operate in improving soils and supplying calcareous matter, though not in the active and immediate manner in which lime operates. Their application, however, is considered by many as preferable to lime. On this subject we want more experience. The Berkshire shell-marls, which have been recently discovered, contain from 80 to 90 per cent. of lime. The operation of shell-marl, or marl containing a large amount of shells in a state of decomposition, is much slower than that of quick lime; but its effects are quite lasting. When applied to heavy soils and soils naturally cold, it enriches vegetation, but does not forward it.

Potash, or vegetable alkali, is stated to be of more value than lime in producing the humin which is deemed the essential food of plants. Some value it at a much higher rate. It has been applied at the rate of from 50 to 100 lbs. to an acre; and, as stated, with great success; but I have no knowledge of any such decisive experiments as would justify me in speaking with confidence of its effects, or the mode of its application. Mr. Williams's great crops of wheat have been assisted by fifty bushels of wood ashes spread to an acre; and a good crop of wheat seldom fails to be obtained on newly cleared and burnt land. The potash is here present in large quantities.

Leeched ashes and soapboilers' waste are esteemed a most valuable manure. A good deal of lime is ordinarily mixed with them; and they abound in vegetable alkaline matter, which is highly favorable to the crop. They should be spread on the surface, and harrowed in. From fifty to one hundred bushels can be safely applied to the land, though few farmers will feel that they can afford the application at the prices at which they are at present held. I have used them with great advantage; and one great advantage from the use of bone manure and ashes is, that they do not introduce weeds into the soil. The farmers on Long Island often import leeched ashes from New England for their wheat lands; and, as they say, with much advantage. They must not be too often repeated on the same land.

Bone Manure, in the form of dust, or small pieces and dust intermixed is a most valuable manure. It contains a large proportion of the phosphate of lime, which has always proved a most efficient aid to vegetation. Forty bushels of crushed bones, or twenty-five bushels of bone dust, to an acre, have been found as efficient as a much larger quantity; and no advantage whatever has come from doubling this amount. Bone dust mixed with ashes has been highly efficacious. The best mode of application is to mix them with mould, or barn-yard compost; and if for grain crops spread and harrow them in lightly; but it is essential that they should undergo a degree of fermentation before they are applied to the land; and that the land to which they are applied should be dry. The lands on which bone manure has been found efficacious have been light, dry, and sandy soils:—upon clayey or heavy soils it has not been useful. If for immediate effect, the bone dust is to be preferred; if for permanent improvement, the crushed bone. At the only mill known in Massachusetts, which is at Roxbury, the manufactured article contains a good deal of the dust intermixed with the crushed bones. It is sold here, we understand, at 35 cents per bushel, and large quantities are on hand to be supplied.

The application of lime, too, should never be

made but in dry weather, and when the land is dry; as otherwise it is apt to be formed into a mortar, which is not easy of solution. Lime applied in any form to the land, it is to be remembered, is not an enricher of the soil; and therefore, if lime alone should be applied for a succession of years, and all putrescent or vegetable manures be omitted, the land would be losing instead of advancing in fertility. It is merely a preparer or evolver of the food of plants.

Gypsum has not been found of any apparent value to wheat.

Saltpetre. Another manure, never, we believe, used in this country, from foreign accounts deserves a trial. This is saltpetre. It has been used at the rate of one cwt. to the acre, finely pulverized, and sown broadcast upon the growing crop; and its beneficial effects upon the plant are stated to have been remarkable, especially in its effects upon the straw. It is to be used, however, with caution, as not having been sufficiently tested.

From the American Turf Register.

TAMING WILD HORSES.

Having announced some months since, that the editor of the Turf Register had become possessed of the secret for taming wild horses, some publication of the results of our experiments has been of course expected, and we now proceed with a statement of facts. We must premise, that there is no man who detests quackery in all its forms, or that abhors more thoroughly the witchery of *charms*, then does the writer of this. It was this contempt for empiricism, that kept him for some years from even listening to the reports of 'taming wild horses' in a few minutes, by aid of some secret means; and when the high respectability of the reporters was forced upon him as a voucher for the correctness of the reports, the same feeling compelled him to attribute those wonderful results, to delusion, to the practice of which, respectable men are as liable to become the dupes as any others. At length, a report came from a source which could not be doubted, either on the score of respectability, or the supposition of delusion—the reporter practised with his own hands, and witnessed the results with his own senses, (see Turf Register, vol. viii. page 261, 262, 263, and 500.*) We then determined to obtain the arcanum and try it ourselves. We have done so, and we are convinced. We shall now state a few facts. Having had no opportunity of course to try it on *wild horses*, our experiments have been confined to balky horses, and we have had but three chances even with them, and they were accidentally met with, and of course we were not *duly* prepared. A friend was found in the street with one of his carriage horses refusing to go. It was an old trick of hers, (it was a mare,) and in a ride of two miles, she had stopt several times, laid down in the road, and acted the stubborn and sulky brute in all its characters. When we found him, our friend was stuffing the animal's ears with soft paper; he had whipped the brute till he was tired, the paper was speedily shaken out by the animal. We approached the mare, asked our friend to desist from further efforts, saying the mare would go presently, at the same time applying the arcanum slightly, but not perceptibly to any of the bystanders. In less than ten minutes, I told my friend I thought she would go; he took the reins, she went off handsomely, travelled seven or eight miles out, returned in the evening, and exhibited no more signs of balking. We have not heard whether the animal has balked since; but should not be surprised if it did, as the operation was very slight and imperfect, from our not being properly prepared. The other two cases were both alike precisely, at different times. They were horses with heavy loads of wood on carts at the foot of the long hill in Charles street. We found the drivers whipping and beating them with the but-end of their whips over the head, and the horses in a perfect frenzy from fear. We prevailed on the drivers to rest the horses, put up the shafts, approached gently their heads, patted them, and applied the acranum slightly, (being unprepared.) In about five minutes the horses were perfectly composed, and we then told the drivers to take the reins, and start them, but not to let the horses see the whip. They both started handsomely, went up the hill to the top with perfect ease, and without the slightest symptom of a balk. The crowd of negroes standing around were greatly surprised, and expressed their feelings in loud tones. Now, in relation to all of these cases, it may be said, that the change of treatment from an extremely severe, to a mild and conciliatory course, would naturally produce the same result, and therefore, we are not left to the necessity of attributing it to a cause so mysterious as the pretended arcanum. We confess these were precisely our own reflections almost reduced to conclusions, until we had an opportunity of applying the same treatment *without* the arcanum, which had no effect whatever; and before we could return and supply ourselves with the remedy, the horse had been taken out and sent away. But a gentleman on the Eastern Shore of Maryland, has made four experiments with it, much more satisfactory and important than our own. We shall give the description of them in his own words, premising that there is no gentleman in our state who stands higher in the estimation of good men than he does.

1*st Experiment.*—"I have a horse that had stopt at a particular hill two or three times. In every other respect, perfectly gentle and kind. When I got to the hill the horse halted, I got out, applied the arcanum, gave him the word, and he moved off instantly. It appeared to me, that he went with more spirit afterwards than usual."*

2*d Experiment.*—"My next experiment was on a *bull*. It was for the most part satisfactory. We had to throw a rope around his horns and draw him up forcibly to a post and secure him. For some time pending the operation, he made the most violent efforts at intervals to break loose, but in vain. I discovered that he was pinched severely by the rope about his head, and on relieving him from the pressure, he soon yielded to the influence of the arcanum. A yoke and bow were

* See Farmers' Register, p. 481, vol. 5.

* This horse balked afterwards with another person. The remedy has not yet been tried on him thoroughly.

placed on his neck and he was put in the shafts of a cart alone, and driven a mile out and back, and was perfectly tractable. The two negroes who had hold of him were perfectly astonished. The following day, however, he became sullen, but was gentle to handle, would go a little way and then fall flat on the ground, but was in no way vicious. The third day he exhibited the same sullenness, and after various means had been resorted to, to move him, some straw was placed along side of him, and fire applied to it; as soon as the blaze reached him, he jumped up and went to work honestly. He has fine spirit, can be approached every where, and handled with perfect gentleness—he never laid down after the firing, and never from the first showed any bad symptoms but the one of being sullen."

3*d Experiment.*—"The next trial was on a fine four-year-old mule. A partial attempt had been made to break him last summer, but he kicked every thing to pieces, and I determined to wait for the secret. He was exceedingly vicious, and difficult to approach. We finally succeeded in barring him up in a stall, and getting a bridle on, and securing him properly. The operation commenced by very slow degrees and great caution. He twice got over the bars of the stall with two powerful men holding on to him. You will understand, that his position was reversed, his rump was against the manger, and two bars were put across the stall, resting against the post, the upper bar as high as the top of his back, and to my astonishment he got over, but did not get loose. It was a long time before the arcanum took effect, and I had absolutely begun to despair. A violent storm of wind and rain came on during the operation, and I was much troubled what to do; but just as the rain abated, he began to yield; we could then handle him any where; the gear was put on him, he was led out and put in the shafts of a light cart, the wind blowing terribly, he moved off finely, was driven out several miles and back; taken out, fed, and after dinner, eight or ten light loads of manure were hauled by him. He is true to the draft, has prodigious spirit, and works well in a cart; he has, however, kicked a few times. This mule could probably never have been subdued by the ordinary methods."

4*th Experiment.*—"I broke another mule of the same age as the above, this evening, with about one-fourth part as much of the arcanum as was used on the preceding."

It is proper to remark, that the same gentleman tried the remedy on a fine blooded mare last winter, and failed to produce any effect, or if any, very slight. But believing that circumstances prevented a full and fair trial, the report of her case is deferred until another effort is made.

In relation to the experiments above reported it is also proper to explain that the sullenness of the bull might probably have been overcome by the application of the arcanum, though the firing was equally as easily applied. As to the prolonged and tedious operation on the mule, in the third experiment, the cause is perfectly apparent to us, and we were surprised that it did not occur to the very intelligent operator. It was the violent *wind.* We cannot with propriety explain the *modus operandi* of this cause in this place, but it will be perfectly plain when suggested to those in possession of the arcanum. The weather should always be perfectly calm during the operation, or the animal should be placed in a stable perfectly closed against its effects. It was not, we think, the devilishness of the animal, that resisted such persevering treatment, but the unfair chance the treatment itself had of being effectual.

Now let us ask all persons acquainted with horses, to examine the above cases candidly, and to refer to the statements of 'Sigma,' (above referred to,) and then say whether there is any delusion in the 'secret for taming wild horses.' Next to the evidence of our own senses, is the testimony of reputable men; but we surely cannot resist both. We know the magnitude of the draught we are making upon human credulity; but are we not armed with a force that at least authorizes the attempt? We know full well that the present received system of philosophy, will reject even all the testimony we have adduced, because "the why and because" are not developed—because the philosophers cannot trace the effect to the cause, or because an effect is said to be produced by a cause not heretofore recognized! But we will venture to place before them, a still more formidable stumbling block. This singular effect is produced by causes heretofore held by philosophers to be utterly *powerless!* Though they have been known, perhaps, for hundreds of years, and used by millions of people, with the thoughtlessness of thumbing a nosegay, none but the initiated few ever suspected the power of the toys they were playing with. Physicians do not recognize in them any medical effect whatever, (nor are they mentioned in their books,) and yet the writer of this believes them to possess a power over the animal economy, superior to that of any received practice. *How* they operate the writer has not fully made up his mind upon, but he thinks from the few observations he has been able to make, that they effect a complete change in the nervous system, rendering the animal proof against nervous irritation of all kinds.

The most unpleasant circumstance connected with this great remedy is the necessity we are under of keeping it secret. The few persons who possess it, have obtained it under solemn pledges that it should not be published, and paying considerable sums. We have the privilege of communicating it to individuals in our discretion, but not to authorize them to divulge it to others. This circumstance of secrecy gives it the appearance of a speculation, and causes doubts as to its value. As soon, however, as all interested, shall have been *indemnified*; we have hopes of getting the privilege of publishing it, and we pledge ourselves to the public that we shall omit no effort to accomplish the object.

REAPING MACHINE.

The *Mémorial de l'Allier* mentions a very simple and ingenious machine, which had just been examined, the aim of which is an increase of produce to the cultivator, with less labor. Its other advantages are, the simplicity of the mechanism, the facility of construction, and the moderate price (15 francs at most.) Two sickles, seven or eight pieces of wood, some semicircles *(demi-circles,)* and two yards of cloth, compose the mate-

rials. The corn is cut by the play of the sickles in a breadth of 4 ft., and at the desired height. (*L'Echo du Monde Savant, Dec.* 13, 1837.)

From the National Gazette, October 6th, 1836.

TOBACCO TRADE.

It was desired by several of our friends, who are largely interested in the trade of tobacco, that we should endeavor to obtain and forward to them a statement of the exports of that article, and of its various kinds, viz.: Ohio, Kentucky, Maryland, and Virginia, for a series of 15 or 20 years, to enable them to form some opinion as to the probable increase or falling off of the consumption of tobacco, and of the particular description increased or diminished in consumption in particular countries. Such a statement would not only be highly useful to dealers, but also to planters; but there are no data from which it can be compiled, as the records of exports seldom or never designate the description of tobacco exported. In the course of our efforts to obtain the desired information, we became possessed of all the facts relating to the growth and exportation of tobacco which are to be obtained from the records of our own country, and the published documents of others, so far as they were accessible.

A letter of the Governor and Council of Virginia, dated James City, January 20th, 1622, says, "that there was not above 60,000 pounds made in the colony;" but in 1639, only 17 years afterwards, the Grand Assembly passed a law, which recites, that, "Whereas, the excessive quantity of tobacco of late years planted in the colony, has debased the quality," and enacts, "that all the tobacco planted this present year, and the two succeeding years, in the colony of Virginia, be absolutely destroyed and burned, excepting and reserving so much in equal proportion to each planter, as shall make in the whole just the quantity of 120,000 lbs. of tobacco, stripped and smoothed, &c. In consideration whereof, the creditors of the planters were compelled to "accept and receive 40 lbs. of tobacco so stripped and smoothed, in full satisfaction of every 100 lbs. now due them." It is not important to ascertain whether this law was re-enacted at the end of the 3 years named in it; for we find in an official report to the commissioners, that the yearly exports of tobacco for ten years ending in 1709, were 28,868,666 lbs. of which 11,260,659 lbs. were annually consumed in Great Britain, and 17,598,007 lbs. in other countries of Europe. In 1744--1776, the average annual exportation was 40,000,000 lbs., of which 7,000,000 lbs. were consumed in Great Britain, and 33,000,000 lbs. in other European countries. The annual average exportation from 1768 to 1770, both inclusive, was 67,780 hhds. of about 100 lbs. each, or 67,780,000 lbs. As we have now approached the period when the exportation of tobacco arrived at a point from which it has vibrated, (sometimes a little above or below it,) we subjoin a statement of the exportation for the years 1772-1775, inclusive, which will furnish the remarkable fact that (compared with any succeeding four years since that period) the annual exportation of tobacco just before the revolution, was about the same that it has been at any time since, in our most prosperous periods. For although 1790-1792 were three years of very heavy exportations, they fell off in 1793 nearly one half, making the annual average exportation not materially different from 1772-1775;

Statement showing the quantity of tobacco exported from the United Colonies from 1772 *to* 1775 *inclusive.*

Years.	Pounds export'd	Pounds consumed or remaining on hand in Great Britain.	Pounds consumed or remaining on hand in other countries of Europe.
1772	97,799,263	97,791,805	7,458
1773	100,472,007	3,695,564	96,776,443
1774	97,397,252	18,698,337	78,676,915
1775	101,828,617	27,623,451	74,205,166
Tot.	397,497,139	147,809,157	249,665,982

Total exportation for the four years, 397,497,-139 lbs., or an annual average of 99,374,785 lbs. This brings up to the period of the Revolution. The following will exhibit the exportation of the article during that period.

Statement showing the quantity of tobacco exported from the United Colonies, from 1776 *to* 1782, *inclusive.*

Years.	Pounds export'd	Pounds consumed or on hand in Great Britain	Pounds consumed or on haad in other countries of Europe.
1776	14,498,500	*	14,498,500
1777	2,441,214	†	2,441,214
1778	11,961,533	7,520,550	4,440,783
1779	17,155,907	10,982,899	6,173,008
1780	17,424,267	11,474,791	5,950,176
1781	13,339,168	7,600,296	5,738,872
1782	9,828,244	6,364,813	3,463,431
Tot.	86,649,533	43,943,349	42,705,984

Total exportation for the 7 years, 86,649,533 lbs. or an annual average of 12,378,504 lbs. Of the total 7 years' exportation, 33,974,949 lbs. were captured by the British during the war.

The following table exhibits the exports of tobacco from the United States, for the years 1787, 1788, 1789, immediately preceding the adoption of the present constitution.

Statement showing the quantity of tobacco exported from the United States from 1787 *to* 1789, *inclusive.*

Years	Pounds export'd	Pounds consumed or remaining on hand in Great Britain.	Pounds consumed or remaining on hand in other countries of Europe.
1787	99,041,000	45,379,795	44,661,205
1788	88,595,000	39,600,404	48,995,186
1789	88,675,000	48,831,232	39,843,768
Tot.	267,311,000	133,811,431	133,500,159

*This year Great Britain exported to the continent nearly 26,000,000 lbs. of old stock.

†Great Britain exported this year to the continent 6,000,000 lbs. of former stock.

Statement exhibiting the number of hogsheads of tobacco exported from the United States from 1790 *to* 1835, *inclusive, and the average price per pound, and gross value from* 1802 *to* 1835, *inclusive. Also the number of pounds of manufactured tobacco and snuff exported from* 1791 *to* 1835, *inclusive, and gross value from* 1817 *to* 1835, *inclusive.*

Years.	No. of hhds. leaf tobacco.	Average price per lb.	Total value.	Manufactured tobacco lbs.	Snuff.	Value of Manufactured Snuff.
*1790	118,460	Average price per lb. not ascertained.	Total value of leaf tobacco unascertained.	81,122	Snuff and manufactured tobacco included.	Value unascertained.
1791	101,272			117,874		
1792	112,428			137,784		
1793	59,947			19,370		
1794	72,958			20,263		
1795	61,050			29,181		
1796	69,018			12,805		
1797	58,167			142,269		
1798	68,567			406,076		
1799	96,070			457,713		
1800	78,686			472,282		
1801	103,758			233,591		
1802	77,721	6⅝ c	$6,220,000	152,415		
1803	86,291	6	6,230,000	298,139		
1804	83,341	5⅞	6,000,000	428,460		
1805	71,251	7⅜	6,341,000	381,733		
1806	83,186	6¼	6,572,000	274,952		
†1807	62,236	7⅜	5,476,000	36,332		
‡1808	9,576	7⅜	838,000	350,835		
1809	53,921	5⅞	3,774,000	529,285		
§1810	84,134	5	5,048,000	752,553		
1811	35,828	5	2,150,000	588,618		
‖1812	26,094	5	1,514,000	283,512		
‖1813	5,314	5	319,000	79,377		
‖1814	3,125	6¼	232,000	1,034,045		
¶1815	85,337	8	8,235,000	576,246		
1816	69,241	15¼	12,800,000	1,115,874	5,080	$281,509
1817	68,365	12½	9,230,000	1,486,240	5,513	373,875
1818	84,337	10	10,241,341	926,833	13,710	237,192
1819	69,427	10½	8,874,167	593,358	4,996	149,589
1820	83,940	8	8,188,188	1,332,949	44,552	149,083
1821	66,858	7¼	5,798,045	1,414,424	44,602	157,182
1822	83,169	6⅜	6,380,020	1,987,507	36,684	151,955
1823	99,000	5⅜	6,437,627	2,477,990	45,174	203,789
1824	77,883	5½	5,059,355	1,871,368	53,920	172,353
1825	75,984	6⅞	5,287,976	2,179,774	61,801	210,134
1826	64,098	6⅞	5,347,208	2,730,255	45,812	239,024
1827	100,025	5¾	6,816,146	2,637,411	85,655	210,747
1828	96,278	4¾	5,480,707	2,619,399	19,509	202,390
1829	77,131	5⅝	5,185,370	3,199,151	29,425	246,747
1830	83,810	5½	5,833,112	3,639,856	27,967	292,475
1831	86,718	4¾	4,892,388	3,456,071	31,175	295,771
1832	106,806	4¾	5,999,769	3,790,310	13,453	288,973
1833	83,153	5¾	4,755,968	3,956,579	57,826	328,409
1834	87,979	6¼	6,595,305	3,817,854	36,471	357,611
1835	94,353	7¼	8,250,577			

It may be proper to remark, that the weight of a hogshead of tobacco is much greater now than formerly. Originally, tobacco being less compactly pressed, the hogsheads averaged only 600 lbs., but they gradually increased, and in 1770, reached 1,000 lbs. average. At this time Kentucky averages about 1,300 lbs. per hogshead, and the average of all kinds (Kentucky, Virginia, Maryland, and Ohio) we have estimated at 1200 lbs. per hogshead, which we believe to be very nearly right. The annual average exportation for the last 21 years, from 1815 to 1835, inclusive, is within a fraction of 82,760 hogsheads. Taking our estimate of 1,200 lbs. per hogshead to be the true weight, we shall thus have 99,313,000 lbs. as the annual average for the last twenty-one years; and we have seen that the annual average exportation for the four years ending in and including 1775, was 99,374,785 lbs., which establishes the remarkable fact, that the exportation of leaf tobacco has remained stationary for a period of 60 years.

On a careful examination of the foregoing statements, it appears, that when our exports of leaf tobacco, for two or three successive years, much exceed one hundred millions of pounds; for some succeeding years they are proportionably reduced below that standard. It is also evident that the

*French revolution. †Berlin and Milan Decrees. ‡Embargo. § Rambouillet Decree
‖War with Great Britain ¶ Peace.

revolutionary war gave a check to the exportation of leaf tobacco from which it has never recovered; for until that period, as may be seen by reference to the preceding statements, the annual average exportation increased regularly and steadily. It was 37,780,000 lbs. greater for the years 1763 to 1770, than for the years 1744 to 1746; and for the years 1772 to 1775, it was 31,594,785 lbs. more than the annual average for the years 1763 to 1770. In other words, for the 31 years immediately preceding the revolution, our exports of leaf tobacco annually increased very nearly 2,328,000 lbs., and for the 60 years since that period, it has remained stationary, except when interrupted by wars or other commercial embarrassments. The reason is apparent. Before the revolution, all Europe depended on us for supplies of the article; but, being cut off from the supplies, by the war, Europeans turned their attention to growing it for themselves, and have continued to cultivate it all over the continent.

It will be observed that the exportation of manufactured tobacco and snuff has increased more than forty-four fold since 1791, and more than three fold since 1817; but the gross *value* has not proportionably increased, at least since 1817.

From a review of the subject, as above detailed, it will be perceived, that, if it were in our power to furnish a precise statement of the exports of each description of tobacco, and the countries to which it was exported, (although very desirable on many accounts,) it would not furnish satisfactory evidence that the consumption of tobacco generally, or of any particular description, had increased or diminished in Europe, without knowing *what they grow*, as well as *what we export*. We have devoted much labor and attention to this part of the subject; but, although we can learn generally that the production of it in Europe keeps pace with the increased consumption, yet our researches have not enabled us to lay before you any useful statement, either as to the quantity or the qualities grown, except for three years in France, as follows:—

Statement showing the quantity of Tobacco grown in France for the years 1818—1820.

Years.	Kilogrammes.	Pounds.	No. of hhds., estimated at 1,200 lbs. per hhd.
1818	7,418,000	18,545,000	15,454
1819	10,360,000	25,900,000	21,583
1820	13,155,000	32,887,500	27,406

This shows an increased production of nearly double in the three years.

It will strike you with surprise, as it did us, that the consumption of tobacco has increased so much in our own country, as to carry off the very large surplus grown beyond the foreign demand. Formerly, when all the tobacco was grown in Virginia and Maryland, we exported as much as we do now; and now, in addition to those states, which produce nearly, or quite as much as they did then, Ohio, Kentucky and Tennessee, together with Connecticut, Pennsylvania, Indiana and Missouri, produce as much more. We must, therefore, consume more than the quantity repuired for exportation.

Remarks.—If the preceding statements may be relied on as correct, it appears that there has been a very surprising increase of the use of tobacco in this country, and that the annual consumption now amounts to upwards of 100,000,000 lbs.:—giving about 7 lbs. to every man, woman, and child. The sum annually paid by the consumers of this quantity of tobacco in its manufactured state, has been computed by a writer in "The Portsmouth Journal," at $20,000,000.

The following passage is extracted from Dr. Mussey's "Essay on the Influence of Tobacco on Life and Health."—"Eighty thousand dollars' worth of cigars, it was estimated, were consumed in the city of New York in 1810; at that rate, the present annual consumption would amount to more than $200,000. The statement of Dr. Abbot, in his 'Letters from Cuba,' in 1828, is that the consumption of tobacco in that island is immense. The Rev. Mr. Ingersoll, who passed the winter of 1832-3, in Havanna, expresses his belief that this is not an overstatement. He says, 'call the population 120,000; say half are smokers; this, at a bit (i. e. 12½ cents) a day, would make between $7,000 and $8,000. But this is too low an estimate, since not men only, but women and children smoke, and many at a large expense.' He says, that 'the free negro of Cuba appropriates a bit (i. e. 12½ cents) of his daily wages, to increase the cloud of smoke that rises from the city and country.' This, in 30 years, would amount to $7,058 72, a respectable estate for a negro, or even for a white man.

"The Rev. O. Fowler, from considerable attention to the statistics of tobacco consumption in the United States, estimates the annual cost at $10,000,000; time lost by the use of it, at $12,000,000; pauper tax which it occasions, at $3,000,000.

"This estimate, I believe to be considerably below the truth. It has been estimated, that the consumption of tobacco in this country is *eight times* as great as in France, and *three times* as great as in England, in proportion to the population."

According to an estimate given by the editor of the "New York Commercial Advertiser," in a late number of that journal, the cost of the tobacco smoked in the city of New York, is much greater than is stated by Dr. Mussey; but his estimate will probably be thought, by most readers, a great exaggeration. According to the "Commercial Advertiser," 100,000 persons in the city, (about one-third of the whole population,) are supposed to be smokers; and the average cost to each smoker is computed to be ten cents a day—total daily cost, $10,000; and the annual cost, $3,650,000. The anuual cost of bread for the inhabitants of the city, allowing thirteen ounces of bread for each person, and computing flour at ten dollars per barrel would amount to $3,493,050. "Thus a little attention to the subject discloses the painful and disgusting fact that in the clear-headed, sharp-sighted, money-making city of New York, the inhabitants pay more for tobacco than they do for bread."

Statement showing the quantity and value of tobacco exported from the United States, from 1832 *to* 1835, *inclusive.*

Treasury Department, Register's Office, July 4th, 1836.

To	1832.		1833.		1834.		1835.	
	Hhds.	Value.	Hhds.	Value.	Hhds.	Value.	Hhds.	Value.
Russia,	229	$7,500	8	$1,164	21	$1,966	58	$4,818
Prussia,					10	1,100		
Sweden and Norway,	1,912	117,874	1,965	126,888	2,224	138,279	2,735	255,906
Swedish West Indies,	32	874	8	630	52	3,926	59	6,415
Denmark,	292	21,134	206	16,698	311	23,128	168	23,082
Danish West Indies,	673	43,093	252	16,833	387	34,526	407	40,233
Holland,	24,006	1,115,962	19,022	883,625	19,101	1,012,442	17,730	902,911
Dutch East Indies,								
Dutch West Indies,	331	14,623	253	9,584	183	15,720	264	24,010
Dutch Guiana,			57	2,358	21	1,750	33	2,841
Belgium,			3,224	181,980	1,910	96,575	1,005	66,246
England,	36,176	2,319,596	23,772	2,245,733	30,658	2,937,020	27,563	3,397,415
Scotland,	68	3,783	102	12,159			20	3,224
Ireland,	149	22,071	10	1,305				
British Guiana,					51	3,848	40	4,303
Gibraltar,	2,255	116,612	2,455	153,012	2,312	172,711	2,493	306,281
British East Indies,	56	4,046						
British West Indies,	481	26,799	481	30,360	571	51,117	651	67,190
British Am. Colonies,	361	22,070	521	34,563	345	21,460	430	41,154
Hanse Towns,	27,930	1,192,024	21,408	1,091,436	20,611	1,126,728	27,989	1,539,362
France on the Atlantic,	5,626	662,333	4,670	682,766	4,641	613,952	5,259	743,181
France on the Mediter.	153	7,229	112	9,650	134	9,126	1,053	121,170
French West Indies,	726	49,638	477	25,324	665	53,866	600	62,069
Hayti,	514	28,994	399	26,040	417	34,239	537	55,816
Spain on the Atlantic,	1,095	52,081	489	32,077	857	66,328	1,337	178,387
Spain on the Mediter'n.			46	3,202			155	19,186
Teneriffe, &c.,							50	6,287
Cuba,	256	13,536	177	13,072	378	39,094	568	61,747
Other Span. W. Indies,					22	1,343	73	5,149
Portugal,			130	13,115			352	38,043
Madeira,					24	2,388		
Cape de Verd Islands,	214	14,836	209	15,405	57	5,673	77	8,595
Italy,	738	41,670	804	24,040	301	26,106	820	94,582
Sicily,							25	2,413
Trieste,			14	980	5	612	68	6,752
Turkey, Levant, &c.			172	8,030	4	275	4	400
China,								
Cape of Good Hope,							38	4,845
Mexico,	94	2,712	403	14,354	225	14,095	165	10,976
Honduras,	18	621	5	312	18	1,328	62	3,823
Central Rep. of Amer.	41	1,912	70	1,360	480	8,561	114	8,988
Colombia,	45	2,711	13	1,079	17	1,240	87	8,413
Brazil,	815	10,892	141	8,893	21	1,171	237	22,329
Argentine Republic,	164	9,146	111	6,947	1	44	118	13,847
Chili,	87	5,177	71	3,511	245	15,673	44	3,172
S. America, generally,	2	137	13	773			16	1,707
W. Indies, generally,	153	8,429	67	3,910	133	12,653	99	10,095
Asia, generally,								
Africa, generally,	906	58,883	590	41,791	516	49,906	583	56,457
South Seas,			1	68				
N. W. Coast of Amer.	5	275			2	234		
French African Ports,								
Guernsey, Jersey, &c.	10	496						
Malta,			217	10,891	30	3,006	172	16,557
Bourbon,					18	2,116		
Total,	106,806	5,999,769	83,153	5,755,968	87,979	6,595,305	94,353	8,250,577

For the Farmers' Register.

DEEP PLOUGHING, &c.

The Athenian orator, to whom your Frederic correspondent refers, who esteemed action the first canon in the art of eloquence, had reference to the taste and genius of his own times; such would not have been the answer of the late William Pitt, the prince of orators, in the age in which he lived. Your correspondent considers deep ploughing the first rule in successful agriculture: if his theory had been confined to the Valley of Virginia, I should not feel disposed to question its accuracy. Opinions founded on practical experience are entitled to great respect; but the circumstances upon which they are formed are fair subjects of investigation. I spent some time last summer in that part of Virginia, and I did not remark extraordinary diligence in improvement by lime or putrescent manures, nor did I esteem their agriculture of the highest order; but the fine crops of Indian corn and oats afforded full evidence of the richness of the soil. The cause is now disclosed in the substratum containing a portion of carbonate of lime; and improvements made in Maryland and lower Virginia at large cost, are accomplished in that fortunate valley, (for fortunate I must call it,) by the ordinary operations of cultivation. This property in the soil must give great value to the lands, and fully justifies deep ploughing.

Successful, diligent farmers, who have kept their lands up to a state of moderate product, and have improved their fortunes by thrift and care, not unfrequently speak lightly of knowledge derived from books, and, by way of reproach, call it "book farming;" and they derive support from the fact, that good theoretical writers sometimes fail greatly in their practical illustrations. I do not think it can be justly denied, that books on agriculture have contributed greatly to its improvement. By periodicals the approved experience of one region is communicated to another: I am a debtor to the Farmers' Register, and to the Cultivator; but I have seen some mischief done by confident theorists acting upon limited experience.

About thirty years ago, a farmer of this state published a tract on agriculture. Like your Frederic correspondent, he insisted that deep ploughing was suitable to all soils. He supported his theory by facts, and some plausible reasons: among others, as I recollect, that the old exhausted surface might be turned down to recover, and a fresh soil brought up for production. The scheme was generally condemned by the old and experienced farmers, but found favour with the young and confiding, and the price paid for their credulity was diminished crops and impoverished lands. The late Col. E. Floyd, of Talbot, who had then recently come into possession of his estate, and was full of enterprise, was greatly taken with the plan, and experimented to the full extent of the theory. Many years afterwards, I asked him the result of his deep ploughing: he said it proved a most injurious business, and the lands he had so treated were greatly injured. I do not think your correspondent derives support by his reference to England and Belgium; the extent of marling in those countries has rarely been attained in ours in crop cultivation. By lime, ashes, and other suitable manures, they there make a soil; in ours, we only seek to improve. If one cubic foot of suitable manure be added to three or four cubic feet of soil, it is no great matter whether the soil be sand or clay. In this we are instructed by our garden cultivators; and when the facilities of labor and the prospects of profit offer the same inducements, perhaps we shall plough our lands as deep as they do theirs in the Valley of Virginia.

Successful agriculture has of late become a matter of national consideration; whilst schemers and projectors, under color of increasing the national wealth, have received largely assistance from the general and state governments, no fostering ray has been shed on agriculture. Without any support but what it has derived from its own energies, it has been often embarrassed by the wild and extravagant schemes of the commercial and manufacturing community. The failure of the grain crop for the two last years, and the large European importations, have demonstrated that the present production, in a favorable year, is but little more than sufficient to supply domestic consumption; and when the crop is diminished by an unfavorable season, we must look to foreign countries for supplies. In the event of a war this dependence would be exceedingly precarious. Under the administration of the younger Pitt, in a year of scarcity in England, large quantities of rice were imported from the East Indies, and our old enemy, George the Third, ate potato bread, not as a punishment for his sins, but as a good example to his subjects. The "American system" (falsely so called) was adopted under color of making our country in all things independent of foreign nations; and surely, if the manufactures of cotton, wool, iron, and copper, were entitled to a high protective tariff, bread, the staff of life, demands some consideration. I would not ask from congress a protective tariff; because I think the people of the country have a just claim to articles of necessary consumption at the cheapest rate, and because I think a power imparted to the general government for one distinct, separate object, cannot be lawfully exercised for another; but I do think that a sound and enlightened policy dictates that each state should essay the discovery of its own agricultural resources and capacities. It is little more than thirty years since marl was first discovered in Talbot county; it was then thought peculiar to that region; accident, more than enterprise, has disclosed it in many parts of the Eastern Shore. A geological survey and examination of our state by skilful and faithful agents, I have no doubt, would lead to many important discoveries. I should be much better pleased to see a company of men engaged in this work, at the cost of the state, than a corps of civil engineers surveying railroads, on the borders of our navigable rivers.

In most of the schemes of internal improvement there are two classes of adventurers—a large one who pay their money, and who look for profit in the success of the project, and a small band of choice, adroit spirits, to whom the success or failure of the work is a matter of secondary importance. They count on profit in the progress of the work, in salaries, contracts, and speculating on the fluctuating of the stocks. They fully understand the signs of the times, and in prospect of a sinking concern, sell out, clear themselves, and leave the poor gents at the bottom of the well, to surfeit on bitter waters, which they had represented as exceedingly sweet.

Maryland has embarked millions on the Chesapeake and Ohio canal. The notion of carrying it further than Cumberland, I believe, is now abandoned by the wildest schemers; and remuneration is promised by the company to the state, in the transportation of coal from the Alleghany mountains. Suppose coal mines should be discovered on the waters of the Chesapeake, I apprehend the fires of the Alleghany coal would soon go out. The projectors of this great scheme have started on the hypothesis that no coal is to be found in Maryland but in the Alleghany mountains, and our profound legislature has adopted it. I have never heard that there has ever been any boring for coal in Maryland, excepting by Mr. Richard Caton of Baltimore, who was led by a German to believe there was coal at the head of the Severn, in consequence of a small quantity being found on the shore, which most people thought had floated up the river from a Virginia boat. Mr. Caton is an Englishman, a native, I believe, of Liverpool, and well knows what some of our wise men may hereafter discover, that coal is not confined to the mountain regions. There are many coal-mines in England and Ireland at no great distance from the sea. A remarkable one, at Baristones, was for many years worked with profit under the ocean. The Richmond mines are at no great distance from the tide, and coal is found in the champaign regions of the north. It would, perhaps, have been a matter of prudent calculation, before Maryland had embarked her fortunes so deeply in the Chesapeake and Ohio canal company, to have ascertained whether coal could not be found in more accessible parts of her territory. Americans are said, by some traveller, to be a people of very ready impulse. They seize a scheme with the same avidity that old Mr. Shandy did a theory, and often run it to the same excess, of which full evidence may be found in the first annual report of the directors of the Eastern Shore railroad company, to which I invite the attention of all persons who desire a short road to Mexico.

I find I have sadly digressed from my subject: I will conclude with a very few words to the Frederic farmer. I entirely concur with him in his preference of horses to mules and oxen, as beasts of the plough. Perhaps the Conestoga is to be preferred in the Valley of Virginia; but in our hard loamy lands, where there is no stone, a pair of fine-blooded horses will plough more in three days, than a pair of Conestoga in four. His objection to the blooded horse is one of my grounds of preference: I like to see him play and gambol, even at the risk of his neck; and I prefer him to the Conestoga, as much as I do a light-hearted, mercurial Virginia yeoman (who, after the labors of the day, sports with his fellows, and indulges his stray joke, at the risk of a broken head,) to a dull, heavy Dutchman, who eats his supper, smokes his pipe, and goes to sleep.

AN EASTERN SHORE FARMER.

Queenstown, Md. May, 1838.

From (Loudon's) London Gardeners' Magazine.

JAUFFRET'S NEW MANURE.

We have in a preceding page (p. 111.*) directed attention to Kimberley's manure, said to be a most extraordinary and valuable discovery; and that of Jauffret seems to be a parallel discovery of the same kind in France. M. Jauffret, it appears from *'l'Ami des Champs'* for December, 1837, died in November last. He was born at Aix, in the neighborhood of Provence, and succeeded to a considerable landed estate there in 1798. In its cultivation, finding a great deficiency of manure, he tried innumerable schemes to increase it, till at last he hit upon a certain liquid, the composition of which remains a secret, except to those who have purchased the patent right; and which, poured upon any description of soil, mixed with organic matter, produces fermentation, and rapid decomposition. The ley *(lessive)* which is poured over the materials to be converted into manure is said to consist of various ingredients, but not to be expensive; two large heaps of materials to be converted into manure not requiring more than may be purchased for about 3*s*. This manure is said to have been tried in England by H. Handley, Esq., M. P., and found effective; but by others, it is represented as an imposition on the public. We have applied to sources in France which will enable us, we trust, to state something positive respecting it in our next number. In the mean time, our readers may refer to a pamphlet on the subject, of which we have elsewhere given a title. That pamphlet, however, does not give the slightest hint as to the ingredients of the ley.—*Cond.*

* See Farmers' Register, vol. vi., p. 65.

TREATISE ON BONE MANURE,

By Henry Colman, Commissioner for the Agricultural Survey of Massachusetts.

Bones, it is well ascertained, contain in an abundant form the food of plants. They are made up of a large amount of animal substance mixed with earthy and saline matter; and they abound in what chemists call the phosphate of lime, a substance found in some measure in all plants, and a powerful means and instrument of vegetable growth.

Bones have been used as a manure for many years in England. Used in an unbroken state, they were slow in becoming decomposed; and their effects were not very observable. The next attempt was to reduce them by burning; but besides the expense and trouble of doing this, much of the valuable matter contained in them escaped by the operation. Afterwards, mills were invented for crushing or grinding them; and since that time they have been experimented upon in various soils; and are now sought after by intelligent farmers abroad with the greatest avidity. There is no reason why they should not be used to as great advantage among us.

Bones constitute a very efficient manure; a portable manure; and a comparatively cheap manure. Stable manure in Boston and its vicinity costs the farmer in its first purchase, its transportation, and its preparation for the land, not far from five dollars a cord. His land may be manured with bone manure, with equal advantage and for a third of the expense of stable manure; and its actual improvement of the soil will be more permanent.

In England this manure has been principally used for turnips. This is the crop which on their

land commonly precedes wheat. The effect on their turnip crop is very great; causing lands to produce a crop, which had been comparatively barren; forwarding the crop several days in advance of that manured with stable manure; and greatly increasing the product. The effects have been most beneficial upon all the succeeding crops of grain and grass. Few decisive experiments have been made as yet in this country; but in one case the last season, where applied to ruta baga growing side by side with a crop manured by stable manure, 25 bushels of bones produced a much better crop than a heavy dressing of barn dung.

They have been used with signal advantage spread upon grass land; the feed being greatly improved, and the return from the stock fed upon it, in milk and butter through the season, very much increased.

Their effects upon the cultivation of wheat, in Great Britain, have been thus stated after careful observation, compared with best stable manure.

"In respect to the quality of the grain, as 7 to 5.
In respect to the quantity, as 5 to 4.
In respect to the durability of its effects on the soil, as 3 to 2."

In these cases, likewise, are to be taken into consideration the difference in the cost of the two applications; the lightness of transportation of bone manure; and the ease of applying it to the soil.

Of its application to Indian corn no experiments have come within my knowledge; but its advantages cannot be questioned.

As to the form in which it is to be applied to the land, it has been tried in the form of broken dust; of pieces crushed to the average length of half an inch; and of larger pieces. If to be spread broad-cast upon grass land, it should be fine; and in all cases the more finely it is reduced the more immediate are its effects. In long pieces their application is not convenient nor efficient. In the mill at Roxbury, near Boston, they are crushed in small pieces, and at the same time in the process much comes out in the form of fine dust. This is undoubtedly the best form in which they can be furnished; the fine dust supplies the vegetable pabulum for immediate use; and the pieces being longer and gradual in their decomposition effect a permanent improvement of the soil. To the turnip crop they are applied in the drill with the seed; and in their application to Indian corn it might be advisable to deposite them in the hill.

They are sometimes applied singly or mixed with dung or mould. To be thus mixed is deemed the best mode of applying them, and in this case the dung should be decomposed and fine. A compost is formed of bone dust and barn-yard scrapings and muck in the following proportions:

From 50 bushels of bone to 4 or 5 of dung.
" 20 do. to 4 do.
" 12 do. to 8 do.

The proportions, however, must be matter of judgment and experiment with the cultivator.

It is deemed important, in the next place, that the bones should have acquired a degree of heat by being laid in a heap before application to the soil. They will soon ferment laid in a heap and mixed with earth or dung are in a condition to be used. It is deemed well if this preparation of them can be made a month before they are to be applied.

Of the quantity to be applied no certain rule can be given. From 16 to 80 and 100 bushels have been applied: 25 bushels of fine bone dust, or 40 bushels of crushed bones, pieces and dust together, are considered proper proportions for an acre. Persons have found that a larger application than this has not been attended with corresponding advantages: indeed that 25 bushels have been as efficient as 80. As it respects the permanent improvement of the land there is no doubt that the larger quantity would be in proportion efficient; but as to immediate effects no advantage is to be expected from an excessive application; as a small application will probably furnish all of that kind of food or stimulant, which the plant or a single crop will take up. Eight bushels of bone dust mixed with eight bushels of coal ashes, are represented in one experiment as efficient as the whole amount of bone dust. This was, however, only a single experiment; and the permanence of the effects had not been tested. I mention this mode, not so much from confidence in its success as in the hopes of producing experiments, which may prove instructive and useful.

Of the kind of soil to which bone manure is best suited, some matters are well determined. On wet and heavy soils it will not answer. On clayey soils it is stated to have proved positively injurious. On light, dry and sandy soils it has proved most efficacious. It is indispensable to obtaining their benefits, that the land should be dry. Lands deficient in lime are much more benefited by its use than lands abounding in lime. This was to be expected, as a combination of lime forms a considerable part of their substance. On peat soils, when thoroughly drained, its efficacy is very great; and, mixed with sandy mould, perhaps no application could be better for peat soils, when laid entirely dry.

The bone dust, which is to be obtained, is that from bones which have passed through the soap-boiler's hands. This deprives them undoubtedly of some portion of their gelatinous or oily properties, and renders them less valuable than if they could be broken and applied in an uncooked state; but the effect of this operation is not like that of calcining to deprive them of *all* the soft and oily matter; a great deal remains, and experiment has proved that their efficiency is diminished in a much less degree than would be supposed.

This is the best and most authentic information that I have been able to collect on the subject. My own experiments with them have been on a small scale; but accidental circumstances prevented my giving them a fair test. I have great confidence in their utility; and their portable character must strongly recommend them. They may be sent by railroad and water conveyances into the interior in many cases at almost as small an expense as the manure in some places can be carried from the barn into the fields. If they fulfil what they promise, the market gardeners in the neighborhood of the city must find them invaluable.

From what has been here stated we may draw these conclusions:

1. Bones constitute a most valuable manure.
2. The soils to which they are most usefully applied are sandy and light soils; and the land must be dry. On heavy loams and clays they are not useful. To peat lands completely drained they may be applied with advantage.

3. They may be sown broadcast; or they may be placed in the hill or drill. In either case they are not to be buried deep.

4. They are the best applied mixed with mould, or finely rotted barn-yard manure at the rate of six bushels of bone manure to one load of dung.

5. They may be applied to soils at the rate of twenty bushels of bone dust or forty bushels of crushed bones to an acre.

6. For immediate effect bone dust is to be preferred. For permanent improvement bones which are merely crushed into small pieces. At the Roxborough mill the prepared bone contains much fine powder mixed with the crushed bone.

7. Before they are applied they should undergo a degree of fermentation.

8. They may be applied to grass and to pasture lands with great benefit.

It is hoped that the farmers who apply them will carefully observe their operation and effects; and communicate the results to the Agricultural Commissioner of the state.

Their effects, in general, have been much superior to that of stable manure. This has not always proved so; but their lightness of carriage, ease of application, and cheapness are very strong circumstances in their favor. Another circumstance most strongly in their favor, is, that applied in great or small quantities, they carry no weeds into the fields. This is a most valuable quality.

Boston, March 26, 1838.

From the British Farmers' Magazine.

ON THE CULTIVATION OF SMALL FARMS.

Review of an "Essay on the Improvement to be made in the Cultivation of small Farms. By William Blacker, Esq. Dublin: Curry & Co. London: Groombridge."

That this little work should have gone through five editions in so short a time, is pretty good proof that the doctrine that would sweep the small farmers and cotters from the land, is being successfully combatted. The economists may talk as they like, but poor Goldsmith was right:

"Ill fares the land, to hastening ills a prey,
Where wealth accumulates and men decay;
Princes and lords may flourish or may fade;
A breath can make them, as a breath has made:
But a bold peasantry, their country's pride,
When once destroyed, can never be supplied."

Mr. Blacker is determined they shall not be destroyed. He has a better method of curing the poverty of the "peasantry," if the term must be applied to them, than by sweeping them away into workhouses and cotton factories. Their poverty, he knows, has been brought on, generally speaking, by no fault of their own; and that independent of that fact, the destruction of them would be a deadly affliction to the country.

Mr. Blacker's remedy for the poverty of the "peasantry," is *proper encouragement*:—

"I consider myself most fortunate that I am not obliged to act, at present, upon the system above alluded to," [the economist sweeping-away system,] "and that my employers, however they may feel resolved not to continue on their estates persons of careless and indolent habits, are nevertheless determined to assist and encourage all those of an opposite character; and impressed with this kind feeling, are anxious I should make trial whether any thing can be done to reclaim the one and to stimulate the other, and if possible, to put both upon some better plan of supporting themselves and their families, than they at present appear to be acquainted with.

"The only way in my mind to accomplish this is, by introducing such a system of agriculture as would bring the entire of the small farmers' holdings into a productive state, in place of allowing nearly half their farms to remain nominally in grazing, but in reality producing nothing."

He then explains what the system of agriculture he would introduce is. We must here state that Mr. Blacker appears to address himself to the tenants on an estate under his management:

"By referring to the experience of all good farmers in all countries, and under all circumstances, it is ascertained beyond dispute, that by the practice of sowing green crops, such as clover and rye-grass, winter and spring vetches, turnips, mangel wurzel, &c., the same ground which in poor pasture would scarcely feed one cow in summer, would, under the crops mentioned, feed three, or perhaps four the whole year round —by keeping the cattle in the house, and bringing the food there to them; and the manure produced by one of these cows so fed, and well bedded with the straw saved by the supply of better food, would be more than equal to that produced by three cows pastured in summer and fed in winter upon dry straw or hay, and badly littered.

"Here then are two assertions well worthy your serious attention—first, that three cows may be provided with food in the house all the year, from the same quantity of ground which will scarcely feed one under pasture for the summer; and secondly, that one cow so fed in the house, will give as much manure as three fed in the field. I call these important assertions, for if they are really founded in fact, then any of you who may now be only able to keep one cow, would, by changing his plan, be able to keep three, and each one of these producing as much manure as three fed in the way you have hitherto been accustomed to adopt—the result must be, that you would have nine times as much manure by the new method as you have hitherto had by the old.

"One acre of good clover and rye-grass, one rood of vetches, and three roods of turnips, (making up in all two acres, which are now allotted for grazing one cow in summer,) taking a stolen crop of rape after the vetches, will afford ample provision for three cows the year round. For you all know that an acre of good clover will house-feed three cows from the middle of May to the middle of October; and with the help of a rood of vetches, you will be able to save half the first cutting for hay to use during the winter. Then when the first frosts about the middle of October may have stripped the clover of its leaves, the early sown rape, which ought to be put in ridge by ridge as the vetches are cut, and the land well manured, (if the seed has been sown by the middle of July,) will be ready to cut and feed the cattle until the turnips are ripe. Here then you have plainly provision secured until towards the middle of November; and we have to calculate what remains to feed the cattle until the middle of the May following. For this purpose there is a rood of turnips for each cow. Now, an acre of the white globe and yellow Aberdeen turnip, ought to produce from thirty-five to forty tons per acre; but supposing one-half to be of the Swedish kind, let us calculate

only on twenty-eight tons to the acre, which is not more than an average produce, even if they were all Swedish, and see what that calculation will yield per day for one hundred and ninety days, which is rather more than the six months. If an acre yields twenty-eight tons, a rood will yield seven tons, which being brought into pounds, will amount to fifteen thousand six hundred and eighty pounds; and this divided by one hundred and ninety days, will leave eighty-three pounds of turnips for each cow every day, which, with a small portion of the hay and straw you are possessed of, is a very sufficient allowance for a common-sized milch cow; and over and above all this, you have the second growth of the rood of rape coming forward in March and April, which would feed all the three cows much longer than would be necessary to meet the coming clover crop, even in the latest season.

"I think, therefore, I am warranted in considering my first assertion proved; namely, that the ground generally allotted to feed one cow, will in reality supply food for three—and have now only to offer some calculations as to the accumulation of manure; which I hope will be considered equally conclusive. During the summer months, your cow, which is only in the house at milking time, (and perhaps not even then, for the practice is sometimes to milk her in the field,) can afford little or no addition to the manure heap, being upon the grass both day and night; and even in winter and spring, whilst there is any open weather, they are always to be seen ranging over the fields in search of food, so that I think you cannot but admit (upon a calculation for the entire year round,) the animal is not in the house more than eight hours out of the twenty-four, and it is only the manure made during this period, which can be reckoned upon; therefore, upon this supposition, (which I think is sufficiently correct to show the strength of my argument,) if there is any truth in arithmetic, one cow fed as I calculated on, in the house for the entire twenty-four hours, will yield as much manure as three cows that are only kept in the house for eight hours—the quality of the food being supposed the same in both cases; and this would manifestly prove my assertion, that one cow fed within, would give as much manure as three fed without; and therefore when three can be kept in the one way, as I have already shown, for one kept in the other, it is as clear as three times three make nine, that the result of the calculation will be just as I have stated—namely, that the farmer will obtain by the change of system, nine times as much manure in the one case as he would have had in the other. Now, if after all that has been said, (which seems to me, at least, quite convincing,) any of you should be so astonished by the quantity of manure thus proved to be gained, as still to have some misgivings on the subject, and be inclined to think that matters would not turn out so favorable in practice as I have shown in theory, I would wish any such person to consider one very material point which I have not yet touched upon—for in the foregoing the argument is founded entirely on the time the animals are kept within, viz.—it is stated that one cow kept within for twenty-four hours, will give as much manure as three cows which are only kept in for eight hours, the food being assumed to be the same in both cases; but it is quite evident, that if the cow kept within should be fed with turnips, and bedded with the straw which the others are fed upon, leaving them little or no bedding whatever, that the calculations must turn decicedly in favor of the animal which is well fed and bedded, both as regards the quantity and quality of manure—so that it appears the estimate I have made is decidedly under the mark."

Mr. Blacker, after this, enters into minute details of the proper methods of cropping and general management. We cannot in fairness offer our readers even an abridgment of them. They are most judicious, and perfectly practicable to the utterest blunderhead that ever handled a spade. Though addressed to small farmers, not a few "big" ones would profit by attending to them.

But some of our readers will be apt to remark, that though Mr. Blacker's system is so good and perfect, the poverty of the persons who are recommended to act on it, will prevent them from doing so. This certainly seems a serious difficulty. Mr. Blacker, however, shows there is not so much difficulty as seems.

"It is seldom," he observes, "that any one deserving the appellation of even a small farmer, is so very low in the world as not to have a cow of some sort; and the more common case is, that he is possessed of one at least of those useful animals. Let us suppose him then, to have four acres of land and one cow, and that two acres are in grazing, or put out to rest, as it is termed; and of the remainder, half an acre is intended for potatoes, half an acre for first crop of oats on last year's potato ground, half an acre of second crop oats, and the remaining half acre third crop oats; which, altogether, make up the four acres; and, with a small garden, may not be considered to be an unfair representation of the general circumstances of the poorer class of small farmers. Now, if an industrious man, reduced to such a situation by bad health, or any other calamity, without capital, and without friends, was to ask me how he, as a small farmer, might contrive to extricate himself from his difficulties and retrieve his affairs—(and this is a question which, above all others, most vitally concerns the poor of Ireland)—I should answer by saying, if a small farmer means to live by his land, his first object ought to be to make every inch of that land as productive as its nature will admit of; and this can only be accomplished (as I have stated in the commencement,) by having plenty of manure, and pursuing such a rotation of crops as shall prevent the ground from being ever exhausted. Various methods may be taken by him to arrive at this, according to his particular resources and the circumstances of his farm: but, under any state of things, he must keep in mind the fixed maxims of farming already enumerated. By reference to these, he will, in the first place see, that wherever he intends to put on his manure, the land should previously be effectually drained; and likewise, that the weeds should, as far as possible, be eradicated before putting in his crop. If these directions are not attended to, a cold wet subsoil will destroy more than half the strength of the manure, and half the remainder will perhaps go to nourish the weeds, in place of the crop he intended it for. The next thing he will see pointed out is, to provide for the increase of his manure, by preparing the means of feeding his cow in the house, and to refresh his land by a change of crop. It is from want of attention to these points, the returns from his farm have been heretofore so much reduced, that he has been kept struggling in poverty, when, with less labor and more skill, he might have been living comfortably. But as an example will make every thing more intelligible, I should be inclined to recommend him, as one mode of carrying the rules laid down into practice, (draining and clearing his land being always attended to in the first instance,) to sow clover and grass-seed with his first grain crop, as a provision for house-feeding his cow the following year; and he must begin early and put in kail or cabbage into his potato ridges, and sow a succession of vetches on the stubble of his last year's potato-land oats, to serve as feeding for the present. If there should be any overplus after feeding his cow, and that he should not be able to buy pigs to consume it, he may let such part stand for seed, the produce of which will generally be more valuable than any second crop of oats, and the straw from it will be found much

superior to oat straw, as fodder, and contribute to the support of his cow in winter. He will farther observe, by the fourth rule, that the manure for his green crops, such as potatoes, turnips, &c. should be put out upon that part which has been exhausted by grain, therefore let it be given to the stubble of last year's second and third crop of oats; and by attending to the fifth and sixth, and seventh rules, let him take care not to have any of his land or manure wasted; and by burning the backs of old ditches desired to be levelled, he will obtain such a quantity of ashes as will enable him, with his other manure, to sow half an acre of turnips and an entire acre of potatoes, in place of the half acre, as formerly supposed. By this means, he will be able to bring in half an acre of the poorest part of the grazing, the remaining one and a half acres of which may be used for the support of his cow, until the vetches become fit for cutting, when, if he has any ashes remaining, or as far as the summer manure will cover, the grazing may be broken up and prepared for rape. Supposing these matters to have been conducted upon this plan, when the turnips become ready for use, it will be practicable for him to fatten his cow, and sell her for a price that will enable him to make up the price of two lean ones, or at least to add a heifer to his stock. One rood of turnips is calculated to fatten a cow of moderate size, that has been well fed in summer, which his would have been on the vetches; therefore he would have remaining still one rood of turnips, the curled kail, and what rape he might have got sown, to enable him to support the two cows, thus supposed to be bought, for the remainder of the year, until the clover would be fit for use, which was formerly directed to be sown.

"In considering the foregoing, I do not see any extra outlay which can be said to render this commencement impracticable, nor any reason to suppose that the person's means of paying his rent will be in a manner curtailed; on the contrary, it appears to me that, besides the additional half acre of potatoes, the vetches substituted for the second crop of oats will produce, by the superior keep of the cow, in milk and butter, and the rearing of pigs, more than double what an inferior crop of oats would be worth; and that by these articles alone, the entire rent of a four-acre farm would, in common years, be paid, leaving the profit of the remainder of the farm to go entirely to the support of the family and the increase of the stock. But if it is clear from this statement that the farmer's circumstances the first year will not be made worse, it is still more clear that the second year they must be made better: for it is plain he will then have more than double his former quantity of manure, (owing to the turnip feeding and the second cow,) which, with the ashes of his remaining old ditches, will be fully sufficient to bring into cultivation all the remainder of the grazing land lying out to rest, which will now be made to yield him a valuable crop of potatoes and turnips, and he will have the manured land of last season, amounting to one and a half acres, in place of half an acre, as formerly: besides all which, he will have as good a crop after the vetches as after his potatoes; and thus there will be no part whatever of the entire farm which will not be under profitable crop; and the clover, with what vetches he may think it necessary to sow, will supply him with the means of feeding his two cows in the house, by continuing which practice, he will have sufficient manure to keep his land constantly in good heart, and enable him to follow for the future any rotation of crops he may think proper.

"In order to make what I have said more intelligible, I put the statement into figures, viz:—

"*Supposed Case of a Four-Acre Farm.*

Field No.		A.	R.	P.
1	In potatoes (having only one cow, and not fed in the house,) he will not be able to manure more than	0	2	0
2	In oats, upon last year's potato land	0	2	0
3	In oats, being the second crop after potatoes	0	2	0
4	In oats, being the third crop after ditto	0	2	0
5, 6, 7, 8	In grazing, lying out to rest	2	0	0
	Entire Farm Acres	4	0	0

"*Proposed Crop to begin an Improved System.*

Field No.		A.	R.	P.
1	To be sowed in wheat or oats, being last season's potato ground, and laid down with clover and grass	0	2	0
2	To be sowed in vetches, after first crop of oats	0	2	0
3	To be sowed in turnips of different kinds,	0	2	0
4, 5	To be planted in potatoes, supposed	1	0	0
6, 7, 8	Best part of the grazing to remain for one cow, with vetches	1	2	0
	Acres	4	0	0

"*Second Year of Improved System.*

Field No.		A.	R.	P.
1	In clover fit for cutting	0	2	0
2	In oats, (after vetches) if a second cow has been got, one-half vetches may be necessary, unless cabbage and kale are cultivated	0	2	0
3	In barley (after turnips) laid down with clover and grass-seed	0	2	0
4	In wheat (after potatoes) supposed planted on house manure, laid down with clover	0	2	0
5	In oats (after potatoes)	0	2	0
6	In turnips, having been trenched up before the frost	0	2	0
7, 8	In potatoes	1	0	0
	Acres	4	0	0

"The ditches of Nos. 7 and 8 burned, and the produce of two cows fed in the house for most part of the year, will give the requisite manure; and on a comparison of the crops and the keep of two cows, the return appears to be fourfold the value of what it was, with the certainty of the land every year getting better.

"I think any one who will afford a few minutes' consideration to the foregoing, will be of opinion that a satisfactory answer has been given to the question proposed, and that by a simple reference to the maxims laid down, a mode of recovery has been pointed out, which cannot fail to accomplish its object, having for its foundation, principles which may be successfully applied to the circumstances of every such farm as the case supposed; and a more important case cannot well be submitted to the consideration of the friends of Ireland, in its present situation. The plan recommended has been selected as affording a clear and concise exemplification of the operation of the principles laid down, but it is not meant to be a prescribed course that every one should invariably follow; on the contrary, it may be changed and modified in a variety of ways, according to the nature of the farm,

which may call for the introduction of other crops. Thus cabbage, field peas and beans, mangel wurzel, and many other things which I have not taken into account, may, in many cases, be found more desirable than those I have adopted. Where manure is scarce, kale, and thousand-headed cabbage, are particularly valuable; they will grow with great luxuriance upon the back of a new made ditch, without manure of any kind, which proves that nothing more is required to insure a crop than to turn up new earth, by deeply trenching the ground before the frost sets in. Curled kale should be sown the last week in July, or the first week in August, and planted out as early in March as any soft weather takes place; thousand-headed cabbage should be sown in March, and planted out in June or July, as soon as the plants are sufficiently grown; both will give a plentiful crop of leaves at November, and also the following spring, besides giving a large after-cutting, in the manner of rape, when shooting up to go to seed. But, in whatever way the object is accomplished, still the principle of house-feeding, and a rotation of crops, must be equally attended to.

"I am fully aware that a person whose resources enable him to buy lime or other manure, may at once succeed in making his entire farm productive, without waiting for the slower process, which, to his poorer neighbor, may be quite indispensable; but the person with such resources, although he may hold a small farm, does not fairly belong to the class of those by whom the question was supposed to be put, and the answer therefore seems properly restricted to the single object of showing all those to whom it was addressed, that they might get on by their own industry, without any outlay beyond the means they may be fairly supposed to possess; and that if they do not better their situations, it is not by reason of its being out of their power so to do: such being the case, persons so circumstanced, I trust, will not shut their eyes to what is so plainly for their advantage to see. If their farms should be somewhat larger than the case stated, it may perhaps take a little longer time to bring them round, but still the improvement will be progressive, and they will be encouraged as they proceed, by seeing that every step is not only attended with its own peculiar advantages, but likewise facilitates that which is to follow; and I therefore cannot but hope, that any among you whose cases may resemble that which has been stated, may be induced to take what has been said into their most serious consideration, and to try the effect of the proposed change in their system of cultivation, notwithstanding the obstacles which may be started by those who are too indolent to exert themselves, or so much prejudiced in favor of old habits as to think they cannot be improved."

He concludes by showing how he proceeded to improve the condition of the small farmers on Lord Gosford's estate.

"In this, I hope, I have at least so far succeeded as in some degree to weaken your attachments to old customs, and dispose you to follow such instructions as may be given to you; and in order to set aside any excuses that might be made, either on account of ignorance or inability, I have, with the concurrence of your landlords, engaged two Scotch farmers, or agriculturists, for the purpose of giving the instructions you so much require. You will find them to be practical men, who have had experience of every kind of soil, and know how each should be treated. After minutely examining your different farms, they will point out to you how they are to be drained, cleaned, and prepared for the growth of green crops, so as to introduce the plan of house-feeding and accumulating of manure, which has been already insisted on. Thus your want of skill in the management of your land will at once be remedied; and then, to provide you with manure, (the want of which, at present, I am aware would incapacitate you from cultivating the crops recommended,) your landlords have kindly consented to lend such of you as may require assistance, as much lime as will be sufficient to insure you as many potatoes as you may require for your families; on condition that the house manure you may be possessed of shall go to the other crops which the agriculturist may point out. Thus nothing will be wanting to the perfect cultivation of your farms, but your own industry and that of your families; for the above-mentioned assistance will be continued to all such as show themselves deserving of it, until they are brought into a situation no longer to require it. My employers, therefore, I repeat, having gone to such expense and trouble to better the condition of the small farmers on their estates, and the benefit to be derived by following some better plan of cultivation being so evident to the commonest understanding, no one who, by his own want of industry, fails to take advantage of the assistance offered, can have just grounds of complaint, if the land, which he refuses to cultivate, is taken from him, and given to some of his more industrious neighbors, which will most assuredly be the case, when a fair time for making the experiment has been allowed."

We earnestly recommend the Essay of Mr. Blacker to all those who are anxious to preserve the small farmers and cotters, "the bold peasantry," who should be "their country's pride," on the land. Its principles are as applicable in England as in Ireland. D.

ROUTE OF THE MICHIGAN AND ILLINOIS CANAL.

[The following is the most particular account of what will be (when completed) the most grand and remarkable public work in the world. The opening of navigation from the great northern lakes to the Illinois river, and thus connecting the Atlantic, by way of the Hudson and the St. Lawrence, with the Mississippi and the Gulf of Mexico, would of itself be a very great work, and of incalculable value, when the great and rich north-western region shall have been brought generally under cultivation. But the economical effects of this work, great as they will be, are far less striking to the imagination, then the manner in which the navigation will be made; which is by giving to the water of Lake Michigan a new and opposite direction, down the Mississippi. According to the statements given below, of the levels of the waters, and the intervening land, it is practicable, by increasing the depth of the artificial canal, to draw off any quantity of the water of the great lakes Michigan, Superior and Huron, down the channel of the Mississippi; and even to make this new outlet, the principal one of these great sources of the St. Lawrence; if there were any sufficient object for directing these waters to the Gulf of Mexico instead of the Gulf of St. Lawrence. The world perhaps does not afford so magnificent a subject, for the art and labor of man to change and control the appearance and the action of nature. One of the ancient kings of Abyssinia made a vain effort to convey the waters of the upper Nile, by a canal into the Red Sea, for the purpose of depriving Egypt of that source of fertility, and even of existence. In

this case, a diversion of a much greater volume of water, and to a more remote destination, will be perfectly practicable; and the power which holds the upper extremity of the canal, may at pleasure direct this enormous flood either to a northern or a southern part of the ocean, two thousand miles apart.

But the interest of these speculations extends still farther, and to another subject. It is evident, from the geological features of the country, that the great northern lakes at some early time stood so much higher than at present, that part at least of their waters actually were discharged down the valley of the Mississippi; and that the proposed new canal will but renew a passage of water which nature had at first provided. The great barrier of limestone which forms the southern boundary of Lake Michigan was less destructible than that which is still wearing away under the action of the cataract of Niagara; and by that slow but continued process the levels of the lakes have been greatly lowered.—ED. FAR. REG.]

[Extract from the Journal of Science.]

Before dismissing this very striking appearance of the coast connected with the action of the lake, I must be permitted to express the opinion, that a careful examination of the country bordering on the Kankakee and the Des Plaines valleys, will afford evidence of the occasional overflow of the lake at ancient periods, in those directions. It is a well known fact, that the lip of the lake, near its south-western extremity, is at one place so depressed as to permit canoes to pass from the head waters of the Chicago river across to that of the Des Plaines. Nor would the circumstance cease to be an alarming one to the safety of this portion of country, except for the fact that the border to the lake is every where composed of a firm limestone. If then the waters of the lake are still capable of interlocking with those of the Des Plaines, it is clear that at a higher level of the lake, considerable descents of water upon the low country must have taken place. Traces of such incursions appear to exist on the stage road from Chicago to Ottawa, in the general direction of the swells of land on the rolling prairie, and more particularly in the width and depth of the Des Plaines valley, and the immense diluvial accumulations it contains below Juliet.

No internal improvement in the country will surpass in commercial importance the canal which is to unite the waters of Lake Michigan and Illinois river, since it will complete the navigable route from the Gulf of St. Lawrence to the Gulf of Mexico, and open a water communication, so to speak, from the Rocky mountains to the Atlantic coast. The cost of the undertaking in some degree keeps pace with its importance; for although neither the line of its extent, nor the amount of its lockage, is great, still the difficulty which grows out of obtaining an adequate supply of water for the summit division of the route, renders it the most expensive work of the kind ever projected. It is indeed a fortunate circumstance as affecting the certainty of its completion, that the means for defraying its construction are already in the possession of the state, the general government having given the alternate sections of land for five miles on each side of the canal to the state of Illinois, to be appropriated to this important undertaking.

Before speaking of the geological features of the country over which the canal passes, a brief sketch of the route it takes, and the nature of the difficulties it has to encounter, will be given, inasmuch as such a notice will serve in some degree to explain the topographical features of the region.

The canal passes up the south branch of the Chicago river a distance of four miles, thence over the level prairie in a direct line eight miles, to the valley of the Des Plaines river, down the valley of this stream, past the mouth of the Kankakee, to the banks of the Illinois, whose border it pursues for a distance of fourteen miles below Ottawa, where it enters the river. Its length is one hundred and two miles; and it is constructed with a breadth of sixty feet at the water surface, and a depth of six feet. The lockage is all downwards, and amounts to one hundred and forty-two feet.

Before adopting the present route, an attempt was made to obtain a supply of water for the summit division, from the Des Plaines, the Calumet, and the Fox rivers; but on running a level from the Des Plaines, nearly opposite the mouth of Portage lake, to the Fox river at Elgin, (thirty-five miles south of the state line,) where the surface of the stream is one hundred and fifteen feet above Lake Michigan, it was found, that the intervening ridge had an elevation of fifty or sixty feet, the cutting down of which would be too expensive to justify the expedient. The commissioners were accordingly led to adopt the magnificent plan of making Michigan the feeder to the canal. The first level thereby becomes thirty-four miles in length, with an average depth of cutting of eighteen feet, which is principally in solid rock. The depth of six feet of water has been decided on, in order to secure to the canal a constant depth of four feet during the fluctuations of tide in the lake, occasioned by high winds. A declivity is given to the bottom of the canal, of one-tenth of a foot per mile. There are two locks situated at the end of this level, having a lift of eighteen feet. Above the first of these, for the distance of three quarters of a mile, the canal has a width of one hundred and twenty feet. The estimated expense of this level is $5,871,324.

The middle division of the work extends thirty-seven miles from the head of the first lock. It has six locks, with an aggregate lockage of fifty-seven feet in the first four miles, for the whole of which distance the route is over little better than solid rock, and is consequently very expensive. Another difficult portion of this division commences about two miles below the crossing of the Du Page, and extends nearly to Dresden, below the mouth of the Kankakee. The bluffs here are from one hundred to one hundred and fifty feet high, and approach so near the river as to be washed by it, which renders it necessary to construct the towing path wholly or in part, in the river, for a distance of more than two miles; consequently, an expensive protection will be demanded to defend the work from the ice-floods of the Kankakee.

The western division has sixty-eight feet lockage, and is twenty-nine miles in length, exclusive of four miles of the Fox river feeder. From the first lock, below Ottawa, to the termination of the canal at La Salle, (on *section* fifteen,) the route

lies through much wet ground, being along the bottoms of the Illinois, just under its northern bluff. As these lands are overflowed during the spring-freshets, the level of the canal requires to be considerably raised, and to be guarded by strong embankments. The construction of a canal-basin, at the termination of the canal, with an area of five and a half acres, whose bottom is to be considerably elevated above the present level of the bottom-lands, serves to render this division of the undertaking also very expensive. The cost of the entire canal, as estimated according to the report of the commissioners, is $8,654,337; but it is admitted that the estimate is too low, it being generally believed that the work will not be brought to a state of completion under ten millions of dollars.

The geology of the chief portion of the route above described, is exceedingly simple and uniform, the great rock formation of the country being the *magnesian limestone;* at least, this is the rock from the commencement of the canal, (four miles from Chicago,) nearly to the mouth of the Kankakee. It also re-appears west of the Fox river, as will presently be pointed out, and enjoys a wide distribution probably throughout the whole of Upper Illinois and Wisconsin. A good opportunity for examining its character occurs near Chicago, where the excavations have already been commenced. It here rises quite to the surface of the prairie. It is imperfectly stratified, with an evident dip of 10° or 15° to the north-west. Its color is light grayish-white, with a frequent shade of yellow. It is compact in texture, and often slightly cellular or cavernous—a peculiarity which seems to be connected, for the most part, with the profusion of organic remains existing among its materials at the period of its formation. The following is a brief list of the fossils which fell under my observation at this locality: two species of *Orthocera*, a *Turbo* (one and a half inches in diameter) with a depressed spire; a large species of *Pectunculus?;* a *Terebratula*, (with very prominent ribs, and but few in number;) two species of *Ammonites;* a *Caryophyllia*, and a *Favosites.** Some of the beds are wanting in fossils, and occasionally the rock puts on a shistose or slaty structure, in which case it forms a valuable flagging-stone, which is already employed to some extent in Chicago.

The same rock re-appears in the bed of the Des Plaines, twelve miles from Chicago, on the road to Juliet, as well as near the surface of the prairie at Plainfield, nine miles from Juliet, and very abundantly also at this last place. The beds at Plainfield and Juliet, however, are not rich in fossils. The rock is quite close in its structure, and where acted on by the weather, of a yellowish buff color, much resembling the lithographic stone of Sohlenhofen, in Bavaria. The quarries at Juliet afford it in very even, distinctly stratified layers, whose position is nearly horizontal, their thickness being such as to render it a very valuable building material. I noticed one variety of the rock at this place, which had been thrown out in sinking a well, the appearance of which was very analogous to that of true dolomite, (the gurhofian variety.) Its color is a grayish-white, with a tinge of green; throughout the masses were crevices and openings, whose walls were lined with transparent crystals of quartz.

The magnesian limestone continues very abundantly in the bed of the Des Plaines, below Juliet, and recurs frequently on the road across the prairie to Holderman's grove, twelve miles east of Ottawa; after which, no more rock was observed until I reached the bed of Fox river, just above the village of Ottawa. At this point, we strike upon the coal formation.

Of the existence of formations more recent than the magnesian limestone in this region, my own observation permits me to add nothing, beyond what has already been stated under the head of the lake shore near Chicago. By the kindness, however, of Mr. W. B. Ogden, the mayor of Chicago, and Col. Thornton, president of the board of commissioners for the canal, I am enabled to annex some additional particulars. The excavations for the canal on the wet prairie give the following superficial formations: one to two feet, black vegetable mould, and two to six feet, yellow, clayey loam, resting on blue clay. On reaching the Des Plaines, the sections give, in the first place, one foot of black mould; secondly, four feet, yellow sandy clay; thirdly, one and a half feet clean black sand, and lastly, twelve feet "vegetable formations with shells."*

The occurrence of boulders in the rolling prairie had often been mentioned to me, under the significant and original appellation bestowed upon them in this region, of "lost rocks." Their abundance, however, surpassed my expectation. They first attracted attention soon after leaving the twelve-mile house from Chicago, and appeared to form a belt between a quarter and half a mile in width, whose direction was north-west and south-east. In crossing this belt, it was uncommon to pass many rods without encountering a boulder. In general, they were rather more than half buried in the soil. They varied in diameter, from ten inches up to three feet, and belonged to the following species of rocks; granite, granitic gneiss, and trap. A few detached boulders only were noticed between this deposit and Ottawa. Soon after leaving this place, however, another band or patch of them was passed. They were here scattered over the Illinois bottoms so plentifully, as to prove objects of no inconsiderable annoyance in the road. Two miles below this locality, likewise, a number of large masses were seen. Others were occasionally met with south of this point, out upon the rolling prairie, in the direction of Vermilionville. What serves materially to heighten our interest in these boulders is, the consideration that they must have been transported over a distance of between two and three hundred miles, since the southern shore of Lake Superior is the nearest region affording rocks of a similar character, *in situ.*

* Several of these species I am persuaded are new; but I defer a particular description of them until I shall obtain an additional supply of specimens, promised me by Dr. Brainard, of Chicago.

* From the same source, I learn that the magnesian limestone beneath these deposits often abounds with vertical fissures, filled with clay, from one inch to several feet in breadth.

BADEN CORN—FOSSIL SHELL BANKS OF SOUTH CAROLINA.

To the Editor of the Farmers' Register.

Columbia, S. C., May 9th, 1838.

A writer in your last number is desirous to have it established, that the Baden, or twin corn, of Maryland, will yield 20 per cent. more than the common corn. In reply to this writer, I will state my experience of it last year in South Carolina.

I planted two acres of this corn on gray, clayey, high land in Fairfield district. The ground had been several years under cultivation, and the corn was moderately manured with compost in the hill. It was planted six feet by two apart, one stalk in a hill. It grew vigorously, and looked well until a drought overtook it in the midst of silking. It did not grow quite as tall as our common corn, (which seems to be a variety formed from the old gourd seed and Tuscarora,) yet the stalks were rather larger and more robust, and it was earlier by two or three weeks. It had put forth luxuriant shoots in abundance, from six to thirteen on every stalk; but the drought seemed to act upon it with peculiar severity, and very many of the shoots perished. When ripe, however, I found it was pretty good corn; and at the gathering, I had one acre of this, and one of the best acres of common corn measured off, that was planted about the same time, on the same kind of land, and measured in the same way; and the corn of each carefully measured for the purpose of comparison. The acre of common corn yielded twenty-four bushels, and the acre of Baden yielded thirty-one bushels and twenty-eight quarts. Here then was a product of upwards of thirty per cent. in favor of the Baden corn. Nevertheless, I should not like to trust to a crop of Baden corn on high land, unless it were naturally rich, or highly manured. A drought in silking time, seemed to be more severe upon it than upon the common corn; and although this may be accounted for in part from the fact, that the common corn was later, and did not get into silk until later in the drought, yet, nevertheless, the Baden corn puts forth such a profusion of shoots, it must necessarily require more rain to support them than a corn that bears only one or two: and if growing upon poor high lands, a drought should fall upon it at the period of silking, I should apprehend a serious failure. I think upon rich high land, retentive of moisture, and especially upon rich, moist, bottom lands, it would yield a prodigious crop. As seed has been pretty widely spread this spring from this crop of mine, we shall have an opportunity next fall for forming a more correct opinion of it.

In your remarks on the Hon. Mr. Elmore's communication, you seem not to have been apprised of the existence of the fossil shell banks of South Carolina. They have been recognised as a continuation of the shell beds of Virginia and North Carolina, from the time of the earliest records of our state. About four years ago, I analyzed a specimen of these shells from a plantation called Mount Moriah, on the Santee, and found it to contain eighty-eight per cent. of carbonate of lime. I then urged it on the proprietor and others, to make a trial of its effects upon their soils; but until the present spring, I believe, not a single trial has been attempted. These beds crop out prominently from the banks of the Santee; and there are abundant indications that they lie extensively at some depth, more or less, underneath the surface of all that belt of country quite across the state, and sometimes crop out upon the surface. Nevertheless, I have reason to believe from all the information I have been able to obtain, that the soil of that region generally contains little or no lime, and their lands are not generally productive. I learn, however, there are certain limited localities, some of which have been more than one hundred years under cultivation, that are still extremely fertile. Is it not probable that these are spots where the shells formerly cropped out upon the surface, and have been decomposed and mixed with the soil?

In conversing with some gentlemen from that section last fall, I was pleased to learn that a spirit for making experiments with these shells was springing up; so that after this year we may hope to begin to hear of some of the results. The community of a considerable part of this shell region is already wealthy; but it is probable they have under their feet a mine that will rapidly increase their wealth very many fold.

J. D.

P. S. The early character of the Baden corn renders it very suitable for replanting the general crop, as the fodder will all ripen together.

From the Cultivator.

CULTURE OF ONIONS.

The onion grows to full size in the northern states in *one* season; but in Pennsylvania and south, it requires *two* seasons to perfect its growth. There, the tops generally die the first season, when the bulb has attained the size of a filbert or walnut; these are planted out the second season, and come to maturity. * *

The cause of the difference, we believe, is to be imputed wholly to climate: the warm weather of the south impairing the elaborating organs—the leaves—and consequently checking the growth, before the bulb has time to acquire the full size. We remember seeing, in the garden of Col. McAllister, near Harrisburgh, Pa., a bed of full grown onions, which the owner seemed proud in assuring us had grown from the seed that year, and which he stated as a remarkable circumstance. We made no inquiry when they were sown, but conjecture that the seed was sown the previous autumn, a practice which, according to Loudon, is common in Portugal, and is often practised in Britain. The onion, in this case, attains its full size by the first of August, before the intense heats of summer. Although the onion is said to be a native of Spain, it probably is indigenous to the mountainous regions, for it seems adapted to the the temperature of this latitude. It withstands our winters, especially if protected by straw or litter. The onion planted for seed is often put out in autumn, or left in the ground for a second, after the first crop of seed has been gathered; it is often sown in September, and particularly the tree or bulb bearing variety. We recommend to sow in autumn, say in September or October, and at mid-winter, if the state of the ground will permit.

Onions are sown in this neighborhood from the 1st to the 25th April, on rich, well prepared ground, in drills 12 inches apart, and are afterwards thinned to a proper distance. The earlier they are sown, the sooner they come to maturity; and, well managed, are a sure and profitable crop.

The tree onion is said to come from a high latitude, where the climate being too cold for them to flower and seed, the flower becomes viviparous, and bears bulbs instead of flowers.

FACT IN NATURAL HISTORY.

We understand that the Beaver has been discovered in Surrey county, near Cabin Point, from 40 to 50 miles from this city. It was for some time believed that they were extinct in that part of the country. A correspondent says: "We saw the dams they had formed of the branches of trees thrown across, and we brought home several of the bits of wood nibbled by them for that purpose." As it is possible they may also be found in some of the adjoining counties in Virginia, we should be happy to receive communications upon the subject. —*Richmond Enquirer.*

LOSS OF SPECIES OF PLANTS.

M. De St. Hilaire states that many species of plants have been lost within the period of history. Within a few years. many species, quite common in the environs of Paris have become very rare; Scilla italica, Spartium purgans, and Pæonia corallina have entirely disappeared from the neighborhood of Orleans; and, even in our own days, the rocks of Vaucluse have been completely despoiled of the Asplenium Petrarchæ. Is it not possible, then, he adds, that many flowering plants, really phosphorescent, may have been lost in the long period which has elapsed since the days of Democritus, Pliny, and Josephus?—*L'Echo du Monde Savant.*

SILK WORMS FED UPON RICE.

In a Chinese work on the culture of the silkworm, lately translated into French by M. S. Julien, a curious process is mentioned, the correctness of which has been proved by experiment. It is said that, in China, in order to supply more nourishment to the silkworms, the mulberry leaves upon which they feed are powdered with the flour of rice. But M. Bonafons of Turin, who translated the work into Italian from the French, wishing to prove the truth of the Chinese process, powdered the mulberry leaves with the flour of rice, with wheat flour, and with other fecula; and found that these various substances, which otherwise are not eaten by the silkworms, become, in this case, excellent nourishment, and cause the worms to develope themselves rapidly. The cocoons of the silkworms fed upon rice flour are much finer and heavier than usual. The other kinds of fecula did not produce a satisfactory result; but it is to be hoped that, by experiments made among the European keepers of silkworms with different farinaceous substances some substitute may be found for the rice.—*Ibid.*

From the Louisville Advertiser.

THE GREAT WORK DONE.

The Herculean task of removing the great Red river raft, has been accomplished. A free and safe navigation for steamboats has been opened entirely through it. If we may be allowed the expression, a mighty river has been restored to its natural channel, from which it had been forced for some centuries. Many steam and keel boats have passed through the channel where the raft was, and heavily freighted. The United States steamer passed out of the head of the raft on the 29th ult., having run up from Shreveport, a distance of fifty two miles, in seven hours and fifty-two minutes. Shreveport is on the river, one hundred and fifteen miles above the original foot of the raft. This shows that the raft was one hundred and sixty-seven miles in length—much of which was covered with a rich soil and heavy timber.

From the point lately termed the head of the raft to the mouth of the Kiamecha river, a distance of six hundred miles, there is no obstruction to the navigation of Red river, and the land is as fertile as any on this continent. In addition to this it is said the tributary streams of Red river afford about eighteen hundred miles of good steamboat navigation, the advantages of which depended on the removal of the raft. When the great work was completed, there was in the country above it about twenty thousand bales of cotton, which have probably been freighted since on steamers to New Orleans. In the region of the raft, we learn the country is rapidly settling, and it is believed two hundred and fifty thousand bales of cotton will be made on lands redeemed by the removal of the raft, in 1842. The value of the improvement is really incalculable. Towns and villages are springing into existence and flourishing where there was nothing but one wide wilderness in 1834. The dense forest is disappearing and immense cotton fields are to be seen in almost every direction. The inhabitants are not squatters, but men owning from forty to two hundred slaves—planters, who will make from two to three hundred bales of cotton each in 1838.

We also learn that vast beds of iron ore have been found in the vicinity of the head of the Raft.

It would thus appear that the ingenuity, perseverance and boldness of H. M. Shreve, superintendent of the work, have added thousands of miles to the steamboat navigation of the southwest, doubled the value of some thirty or forty millions of acres of public land, given an impetus to cotton growing in that region which will accelerate the onward march of New Orleans, and opened a new and most fertile region to the enterprise of his fellow citizens. His snag boats have been found not only serviceable but indispensable machines. Without them the great undertaking could not have been accomplished for several years to come.

From the American Almanac, for 1838.

AGE AND SIZE OF TREES.

There is a great difference in the age that may be attained by different kinds of trees. Some continue to flourish through a long series of ages; nor can any definite time be assigned to them as the natural period of their existence. There are individual trees whose age, as computed by some naturalists, would carry back the commencement of their existence to a period anterior to the deluge; and though we have no very satisfactory evidence that there are any trees now existing of so great an age; yet there is no physical impossibility that such may be the fact.

The age of many kinds of trees may be ascertained, with some degree of accuracy, by felling them and counting the number of the concentric circles or rings of their stem or trunk. The age of trees is also estimated, while they are standing, by their size, appearance, and a knowledge of the laws by which their growth is regulated; and there are some old and celebrated trees, the age of which is known, with some degree of accuracy, by historical documents. There are, however, but very few of the most remarkable veterans of the forest or the field, of which the ages can be ascertained with any precision.

We can notice briefly only a few of the most remarkable trees. For further information, we would refer to the writings of Michaux and De Candolle, the volume on Timber Trees, in "The Library of Entertaining Knowledge," "The Penny Cyclopædia," and "Gentleman's Magazine," for June 1836. The facts in this paper have been derived from these sources and from other works to which reference is made.

1. "The *oaks* are among the patriarchs of Europe." In America there are no less than 29 varieties of the oak enumerated by Michaux. The white oak of the American forest is a much taller tree than the British oak; though its timber is not so hard nor so durable. "It is," says Michaux, "70 or 80 feet high, and 6 or 7 feet in diameter; but its proportions vary with the soil and climate."

The *Wallace oak*, at Ellerslie, in Scotland, 3 miles from Paisley, was a remarkable object at the beginning of the 14th century, and must be at least 700 years old. Its branches are said to have covered a Scotch acre of ground. Many cases of oaks of extreme old age are recorded, some of which have been estimated at 1,500 or 1,600 years. The largest oak known in England, was called Damory's, in Dorsetshire, and was 68 feet in circumference. It was destroyed in 1755. The largest oaks now growing in England, are two near Cranborne Lodge, Windsor; one 38, the other 36 feet round.

There has recently been published in the newspapers a notice of an oak at Ashton, England, said to be the finest in the country, which had been lately sold for 60 guineas, and was expected to be cut down when the barking season for the year (1837) should arrive. The circumference of its trunk, 6 feet above the ground, is stated at 20 feet; the length 72; the circumference at this height being 2 feet. About 30 years since it was sold for £100; but a chancery suit then arose, which saved it from the axe.

In Samagitia, Poland, 30 miles from Kowno, there was a famous oak, which was cut down in 1812. It was 38½ French feet in circumference, and 14 in diameter. "When sawed through, its age was clearly discernible, and found to be almost 600 years."—*Bib. Univ. Aug.* 1831.

Mr. Welles, in a communication in "The New England Farmer," states that in a lot in Dorchester, [Mass.,] given by Governor Stoughton, for the benefit of college education to Dorchester scholars, he measured several oaks which were from 18 to 20 feet in circumference; and in one of them he counted 200 rings, indicating as many years.

The writer of an article on "American Forest Trees," in "The North American Review," for April, 1837, says:—"The largest oak, and indeed the largest tree which we have seen in this country, is a white oak, on the estate of James Wadsworth, Esq., of Genesee, N. Y. The tree is from 24 to 27 feet in circumference at the smallest part of the trunk. Its age cannot be less than 500 years, and it must, therefore, have been a majestic tree at the time when Columbus discovered the western world. It appears to be still in a healthy and vigorous condition, and bears in its exterior no marks whatever of decay. It is by no means improbable that this tree exceeds in size many both in Europe and elsewhere, which are recorded as of greater diameter. For, in the measurement of large trees, it is of great importance to ascertain at what part of the trunk the measurement was taken. Every one must have remarked the difference between the bulk of such trees at the surface of the ground, and at a few feet above."

2. The *yew* attains a great age. The famous *Ankerwyke yew*, near Staines, in England, is older than the meeting of the English barons at Runnymede, when they compelled King John to grant Magna Charta. It is 9¼ feet in diameter. The yews at Fountain's Abbey, in Yorkshire, are estimated at more than 1,200 years old; and some at Fotheringay, in Scotland, have been computed at 2,500 or 2,600 years. One at Fortingal, in Perthshire, is said to be 56½ in circumference; one at Brabourn in Kent, nearly 20 feet in diameter; and one at Hedsor, in Bucks, 27 feet in diameter.

3. The *lime* is said to acquire a larger diameter, in a given time, than any other European tree. There is one at Friburg, in Switzerland, which was planted in 1476, on the occasion of the battle of Morat; and it now has a diameter of 13 feet and 9 inches.

A lime at Trons, in the Grisons, which was a celebrated plant in 1424, existed in 1798, when it measured 51 feet in circumference. Its age is computed by De Candolle at 583 years.

4. The *elm*, both of Europe and America, is a large tree, and has a rapid growth; but the American elm has a more majestic appearance than that of Europe. The former is represented by Michaux as much inferior to the latter for useful purposes; yet he characterizes the American elm as "the most magnificent vegetable of the temperate zone." One which grew at Morges, in Pays de Vaud, is mentioned by De Candolle, which he estimated at 335 years old; and its trunk was 17 feet 7 inches in diameter—(the foot of Pays de Vaud.) Mr. Strutt mentions an elm of

30 feet in circumference, planted in the reign of Stephen; and one near Powick Bridge, Worcestershire, is 25 feet round. The largest elm of Scotch growth, now nearly destroyed, in Teviotdale, near Roxburgh, measured, in 1796, 30 feet in girth.

The elm on Boston common is very conspicuous, both on account of its situation and size; and it is a very beautiful and well proportioned object. According to the statement of Mr. Welles, in "The New England Farmer," "it measures near the ground 23 feet, and about 3 feet above, 20 feet in circumference." Mr. Welles mentions, that "a publication states the measurement of an elm at Hatfield, Mass., as 34 feet in circumference, at 2 feet from the ground, and 24 feet 8 inches above, with a supposition that it is the largest tree in New England. But 'The Gazette' of Northampton states that there are several elms which would compete with it in that place, measuring 21, 22, and even 25 feet, and that one is said to measure 28 feet at some distance from the ground." —*N. E. Farmer.*

5. Some *cedars* on Lebanon, measured in 1660 by Maundrell and Pococke, were found to be 36½ feet in circumference; and were computed to be then 609 years old, and about 800 years old in 1787, when seen by M. Labellordière.

6. In the garden of Olives at Jerusalem, there are now existing eight *olives*, which can be proved by historical documents to have existed anterior to the taking of Jerusalum by the Turks; and consequently must be at least 800 years old.

7. "In the island of Teneriffe, there is a *dragonier*, or *dracæna draco*, which is reputed to have lived a thousand years, and is called the *great dragon*. In 1402, when the island was conquered by Bethancourt, it was as large and as hollow as it now is. Humboldt measured it in 1799, and found it to be 45 French feet in circumference a little above its root. This tree is called dragon's-blood, because there flows from its trunk during the dog-days, a liquor of a deep red, like blood, which is soon condensed, and becomes dry and brittle. It is the true dragon's blood of the shops." *Nouv. Dict. d'Hist. Nat.* This famous tree, which has been frequently visited by travellers, was destroyed by a storm in 1822.

8. The *banian* or *burr tree* (the *ficus indica*) is one of the most curious and beautiful productions of nature. Each tree is in itself a grove, being composed of numerous stems or trunks which are connected together; some of the stems being the size of a large tree. A celebrated banian, called the cubbeer burr, stands on an island in the Nerbuddah, near Baroach in Hindostan. It is said by the natives to be 3,000 years old. It is described by Milton in his "Paradise Lost;" and it is supposed by some to be the same that was visited by Nearchus, an officer of Alexander. The large trunks of this tree amount to 350, and the smaller ones exceed 3,000; and each of these is constantly sending forth branches and hanging roots to form other trunks. The circumference of the whole is nearly 2,000 feet.—*Clarke, Penny Mag.*

9. There are three celebrated *sweet-chestnuts*, on the side of Mount Etna, called *de' cento cavilli*, 180 feet in circumference at the bottom of the trunk; *di santa agatha*, 70 feet; and *della nave*, 64 feet in circumference. They must be of high antiquity; but nothing precise is known on this point; and it almost certain that the first mentioned has been, in reality, formed of five or six trunks grown together. According to Brydone and Glover, this chestnut is 204 feet in circumference.

The Tortworth chestnut belonging to Lord Ducie, in Gloucestershire, England, has been computed to be 900 years old. It measures 50 feet in circumference 5 feet from the ground; and the height of the main stem is 70 feet.

10. The *baobab* of Africa, considered by Humboldt, "the oldest organic monument of our planet," is estimated by Adanson at the extraordinary age of 5,150 years; and, if this is not an over-estimate, it must have been a tree of considerable age at the time of the deluge! The method adopted by Adanson for ascertaining the age of the baobab, was by making a deep cut in the side of the trunk and counting the concentric rings; and thereby ascertaining the proportion between the number and the part of the diameter examined and the whole diameter. But this method cannot insure an accurate computation. The enormous dimensions of its trunk bear a striking disproportion to the other parts. It is not uncommon to find a trunk not more than 12 or 15 feet from the root to the branches, with circumference of 75 to 78 feet. Humboldt mentions baobabs having a diameter of 30 feet. The size of the flowers is said to be in proportion to the size of the tree.

11. Some *cypresses* that were celebrated even in the time of the Moorish kings, existed in the palace-garden of Granada, in 1776, and were supposed to be at least 800 or 900 years old. In America, according to Michaux, the largest stocks of the cypress are 120 feet in height, and from 25 to 40 feet in circumference, above the conical base, which at the surface of the earth, is always three or four times as large as the continued diameter of the trunk. Strabo mentions a cypress in Persia, in girth as much as five men could span; and he believed it to be as much as 2,500 years old. At Atlexo there is a cypress 76 feet in circumference; and one at St. Maria del Tuli, 118 feet round. The deciduous cypress of Chapultepec in Mexico, said to be 117 feet 10 inches in circumference, the younger De Candolle considers even older than the baobab tree above noticed.

12. The *plane tree* (the *platanus orientalis* of the eastern continent, and the *platanus occidentalis* of America) commonly known in the Eastern States by the name of the *button-wood*, and in the Western States by that of the *sycamore*, is celebrated in both continents for size and majestic appearance; but the American species is said to possess a richer foliage, and afford a deeper shade than the Asiatic.

There is now growing in the valley of Bujukdere, near Constantinople, an immense oriental plane, 150 feet in circumference, with an internal cavity of 80 feet. Pliny mentions a plane tree in Lycia, which had a hollow trunk, that afforded a retreat for the night to the Roman consul Licinius Mutianus, with 18 persons of his retinue. This interior grotto was 75 feet in circumference, and the summit of the tree resembled a small forest.

"The *sycamore (platanus occidentalis)*," says Mr. Flint, in his "Geography of the Mississippi Valley," "is the king of the western forests. It

flourishes alike in every part of the valley that we have seen. It is the largest tree of our woods, and rises in the most graceful forms, with vast spreading lateral branches, covered with bark of a brilliant white. A tree of this kind near Marietta, (Ohio,) measured 15½ feet in diameter. We have seen one on the Big Miami, which we thought still larger. Judge Tucker, of Missouri, cut off a section of a hollow trunk of a sycamore, and applied a roof to it, and fitted it up for a study. It was regularly cylindrical, and when fitted up with a stove and other arrangements, made an ample and convenient apartment."

A hollow trunk of an enormous sycamore was fitted up with the requisite appendages and made use of at Utica, N. Y., as a retail shop; and it was afterwards carried to the city of New York for a show. The following notice of such an object, which was exhibited in the saloon of the American Museum, and supposed the same that was used at Utica, is extracted from the New York Traveller. "A sycamore tree of most singular and extraordinary size has been brought to this city from the western part of this state. The interior is hollowed out, and will comfortably accommodate some 40 or 50 persons. It is splendidly furnished as a sitting-room, and contains every article of elegance and usefulness. It has a handsome piano, sofas, glasses, and mirrors, of fit and becoming style; and is decorated with pictures and fancy articles."

13. Of the *pines* of North America, Michaux describes fourteen species, some of which grow to a great size, surpassing in height all other trees of the forest, and are very valuable for timber. He measured near Norridgewock on the Kennebec the trunk of a white pine felled for a canoe, which was 154 feet long, and 54 inches in diameter. The greatest height attained in that region, by the pine, he states at about 180 feet.

Mr. Douglas, a botanist, who was sent out from London, in 1825, to explore the northwest coast of America, mentions two species of pines which grow to an enormous size. One of these species, called the *Pinus Douglassi*, found on the banks of the Columbia, grows, as he states, to the height of 230 feet, and is upwards of 50 feet in circumference at the base. The other species, called the *Pinus Lambertiana*, was found in Northern California. "One specimen, which in consequence of its having been blown down, Mr. Douglas was enabled to measure, was 215 feet in length, 57 feet 9 inches in circumference at three feet from the root, and 17 feet 5 inches at 134 feet. It is probably the largest single mass of timber that was ever measured by man; though some of the growing specimens of the same pine were evidently of greater elevation."—*Timber Trees.*

Lewis and Clark in their "Expedition," mention six species of firs or pines in the country watered by the Columbia, the largest of which is doubtless the same as that called *Pinus Douglassi*. "This species grows to an immense size, and is very commonly 27 feet in circumference, 6 feet above the earth's surface. They rise to the height of 230 feet, and 120 of that height without a limb. We have often found them 36 feet in circumference. One of our party measured one and found it to be 42 feet in circumference, at a point beyond the reach of an ordinary man. This trunk for the distance of 200 feet was destitute of limbs. This tree was perfectly sound, and at a moderate calculation, its size [height] may be estimated at 300 feet."

14. The *mahogany*, a tree found in the West Indies and the central parts of America, is highly valued for its timber. It is a tree of rapid growth, but supposed to be not less than 200 years in arriving at maturity; its trunk has often a diameter of 4 feet; and the timber of a single tree sometimes produces $4,000 or $5,000. The mahogany, or "*Swietenia mahogani*, is perhaps the most majestic of trees; for though some rise to a great height, this tree, like the oak and the cedar, inspires the spectator with the strongest feelings of its firmness and duration. It expands into so giant a trunk, divides into so many massy arms, and throws the shade of its shining green leaves, spotted with tufts of pearly flowers, over so vast an extent of surface, that it is difficult to imagine a vegetable production, combining in such a degree the qualities of elegance and strength, of beauty and sublimity. A single log, imported into Liverpool, weighed nearly 7 tons; was, in the first instance sold for £378; resold for £525; and would, had the dealers been certain of its quality, have been worth £1,000."—*Timber Trees.*

15. The *apple-tree*, though not to be compared, especially in height, to the large forest trees above mentioned, sometimes grows to a considerable size. Mr. E. Hall, of Raynham, Mass., states, that there are two *apple-trees* standing near his house, the circumference of one of which is 13 feet 5 inches 5 feet from the ground, and 12 feet 2 inches 3 feet from the ground; of the other, 12 feet 2 inches 1 foot from the ground, and 11 feet 6 inches 3 feet from the ground; and the reputed age 130 years. Mr. J. Ives states, that in Wallingford, Vt., there is an *apple-tree*, whose circumference is 8 feet 4 inches one foot from the ground; and about 50 yards distant from it, there is a *butternut tree*, the circumference of which is 9 feet 2 inches 18 inches from the ground; and that the branches extend over a tract of land 5 rods in diameter.—*N. E. Farmer.*

For the Farmers' Register.

ON THE ROTATION FOR GRAIN FARMS.

Many publications in the Register disclose a great difference of opinion on the routine of cultivation in a grain country; and some persons improvidently adopt plans without reference to the circumstances by which they ought to be governed. I possess no science in agriculture, and my opinions are the result of a limited experience; but I think the most profitable and advantageous system depends upon the quality of the soil, its state of fertility, and the means possessed for its cultivation. Large crops may be made; but the expenses may absorb all the profits. My aim is to combine profit and improvement. Many years ago, when actively engaged in other pursuits, I purchased a small farm, which had been greatly exhausted under the three-field system. I divided it into five, planted one in corn, in which I sowed wheat; and as soon as I got my fields set in clover, on clover fallow in addition. Under this system my lands improved, and my crops were good; the fallow generally yielding fifty per cent. more than

the corn ground. A long-continued application of gypsum injured my wheat crop, but gave strength to the grass, which I found could not be subdued by a hoe-crop once in five years. Since that period, other lands have fallen into my possession; and having nearly relinquished all other pursuits, agriculture has become an object of greater interest. My lands are now divided into four fields, one of which I cultivate in corn, and another in wheat. I gather neither tops nor blades. My corn-field remains over a year, and is then sown in wheat, and the next spring in clover; after remaining two years in clover, it is planted in corn. I have some lots in orchard-grass, which supplied the loss of the fodder. The clover-field, at maturity, is surrendered to my stock. The advantage of this system is easily computed: the month of September, which was formerly spent in gathering fodder, is now devoted to manuring, and preparing my fallows. One good ploughing, rolling and harrowing will put them in good order, and my wheat can now be put in with ease and expedition. I select the most favorable time from the 5th to the 25th of October. I suffer my corn to remain in the field till the shuck becomes dry, which gives it I think a more perfect maturation; and in the time between sowing wheat and gathering corn, I can always find useful employment. After my corn is gathered, my horses, colts, dry cattle, and sheep are turned into my stock-field, where they find sufficient provision till the first of January, and sometimes till the middle. The shucks and straw are abundant for the winter, with a small allowance of corn for my horses. As an improvement to my system, I intend to enlarge my cultivation of ruta baga; for though you place this crop in the list of humbugs, I deem it very valuable, particularly in the spring, when cattle eat dry food with great reluctance.

The objection which I have heard urged to leaving a corn-field unsown, is, that the ground sustains injury by remaining bare. This has not been my experience. My corn is cultivated before harvest, the crab-grass and foxtail soon spring up; it grows luxuriantly till frost, when the cattle are turned into the field; they tread it into the ground, which I think tends more to improvement than forest-leaves, which are now extensively used in Virginia. Some of your correspondents speak of ploughing in clover in the month of June when in full bloom; by this and a second ploughing, harrowing, and rolling, a field may be well prepared for wheat; but this requires hands and horses dispensable at other periods of the year. In the month of June, I am under hard pressure in cultivating my corn, and cutting hay. I readily admit that a clover-fallow, in a state of perfect preparation, will produce more than a stock-field fallow; but I doubt if provident farmers are generally able to have their clover fallows in the best order. A gentleman who has seen one of my wheat fields within a few days, thinks, if there be no disaster, it will produce thirty bushels to the acre. My calculation is not so high. It is the nature of man to be confident of his own schemes and plans, and to attach little importance to those which differ from them. Of this the United States Bankmen, the Sub-treasury, and the Conservatives at Washington, have this winter afforded strong illustration; and probably, in my humble calling, I may be under strong delusion, but I believe a farm cultivated for ten years, with four fields of fifty acres each, and twenty separate acres for hay, with three acres of ruta baga in the corn-field, and worked by four men and two boys, would be of more value and produce more clear profit in this region, than under any other plan of cultivation.

I insist on the value of ruta baga. I have great respect for chemical experiments; but when experiment and fact are at war, I adhere to the latter. Fat cows, rich milk, and sweet yellow butter, are better proof of the nutritious properties of this plant, than the experiments of a legion of chemists. I think our encouraging prospects for a crop of wheat go to contradict the notion that the earth is waxing too cold for its production. It is strange how men of science differ. John C. Semmes, whom I take to be no mean philosopher, entertained the opinion, that there was a fine fertile country in the bowels of the earth, and that the Lapland deer entered it at the pole in the winter, and grew fat on the pastures; and with proper encouragement, he would have effected a settlement there, if he had found his theory true. Other philosophers hold that the whole is a mass of fire. Of the two, I rather incline to Mr. Semmes's theory; not from the lights of philosophy, but the impulse of taste. I do hope that the secretary of the navy will specially instruct the scientific corps attached to the exploring squadron, if they reach the Pole, to take a peep into the great hollow and fully ascertain whether it is filled with green pastures or burning fire.

RUSTICUS.

Eastern Shore, Md., 10th May, 1838.

REMARKS ON THE SOILS AND AGRICULTURE OF GLOUCESTER COUNTY.

By the Editor.

The agricultural traveller, or observer, who sees the county of Gloucester for the first time, cannot fail to be astonished, as well as delighted, with the general appearance and peculiar qualities of the great body of low-grounds; and his astonishment will not be prevented, or much diminished, by any previous account which he may have heard of this far-famed and highly eulogized body of land. At least so it was with myself. It was not that I had not inquired and heard much, and even of correct description, of the land and agriculture of Gloucester, from residents, or other persons well informed by long personal observation. But when viewing for myself, and for the first time, I soon found, as is often the case, that I had applied all accounts, before heard, to my own preconceived impressions, which were very erroneous, because made by other "low-grounds" and soils of entirely different character. Thus it is that so much of what we hear, and of what would otherwise be interesting or valuable instruction, is of no effect, and is either not noticed, or is forgotten almost as soon as uttered, because the narrator and his auditor have not common or accordant views of the things which are described; or of the opinions which serve as premises and ground-work for the reasoning and deductions. Hence it is, perhaps, that in addition to the want of fitness for the task, and of opportunity for care-

ful and leisurely observation, of the reporter, that my sundry attempts in this journal to describe, and to furnish useful instruction by describing, some of the most interesting and peculiar agricultural soils and practices in Virginia, have had but little effect in spreading the practices which were described and recommended. For this want of common views and premises, it also often happens that a person is the less fitted to describe to strangers, because of his long and intimate acquaintance with the scenes and circumstances which furnish the subjects; and the reverse, that a new and even hasty and inaccurate observer and reporter may be more likely to seize on the most curious and novel points, and impress them the more deeply on others, who are as ignorant of the subject treated, as was the reporter but a short time before. I hope to be excused for thus presenting the claims of ignorance, or of very new and imperfect acquaintance with the subject, to make agricultural reports; for if that claim is not allowed, there will be but little of value left to mine, in this or in previous attempts, made under the like or greater disadvantages, of want of knowledge, and want of time and opportunity for proper observation.

Nearly half the boundaries of the county of Gloucester are formed by the wide waters of York river; but it is not on these waters, as I had supposed, and as most strangers suppose, that the district known as "low-ground" is situated. This great body of land is principally on the other side of the county, and consists of more than 35,000 acres in one body. It begins a little below Gloucester point, (opposite Yorktown,) on the lower part of York river, and includes the whole country to the North river. The short rivers Severn and Ware cut through the low-ground, and the extent of these and of North river, as exhibited on the map of Virginia, shows the breadth of this great body of land. The Severn, Ware, North, and East rivers, are, in fact, not rivers, but merely arms of Mobjack bay, which itself is a broad and deep indentation of the great Chesapeake bay. North river is between Gloucester and Matthews; and East river is wholly in the latter county; but I have named them with the others because all join to form Mobjack bay, and because the continuous level body of low-grounds, of similar appearance, general character, and geological formation, extends across and around the whole; so that a very uniform face and character are presented on all the Chesapeake slope (if that may be so called which is almost a dead level,) of the peninsula formed by the York and the Piankatank rivers. The same marked and peculiar character which distinguishes the Gloucester low-grounds, belongs also to the Back river lands in Elizabeth City; which, like the former, also lie on the refluent waters of Chesapeake bay. Indeed, the Back river lands, which I had before slightly viewed, and which are described in Vol. III. of this work, (page 414) are as much like the Gloucester low-grounds, as if they were part of them. The principal difference is, that the Back river soil contains gravel generally, and sometimes rolled stones or pebbles, both of which are entirely wanting on the Gloucester flats.

Almost every stranger would suppose, that the rivers are merely *bordered* by low-grounds; which, however broad they might be—even if a mile wide—(and my imagination did not stretch farther,)—were separated by ridges, or projecting points of higher land, dividing the waters of each two contiguous rivers. But not so. Though there are numerous and frequent variations of level, yet they are so slight, that the eye can scarcely distinguish them with certainty, or know whether the general inclination of surface, for a mile or two together, is as it may appear, or directly the opposite. It is not by trusting to the eye, but to the standing and flowing of rain water, and other certain indications, that the levels of the surface are known; and to the sight alone, the whole of this great tract, varying from two to more than six miles in width, (or more than the whole length of the short rivers which cut through it,) and from the mouth of York to the mouth of Piankatank in length, is an almost perfect level, elevated but a few feet above the tide-waters which intersect the country.

The "high-lands," which, by an abrupt and very marked change, form the land or western boundary of the low-grounds, are as different as one soil and surface can well be from another. The distance of twenty yards, and often much less, will generally take the observer from low-ground, having all its peculiar marks and qualities, to high-land possessing none of them. For the present, my remarks will be confined to the low-ground district.

The four short rivers are merely creeks, filled with the refluent waters of the Chesapeake. They receive but little spring or fresh water in streams, and therefore they furnish almost no alluvial deposite, to have formed, or aided in forming, the low-grounds. But though not indebted to the usual mode or source of alluvion, this great and valuable body of land is not the less certainly formed by deposites of the water. But it must have been an oceanic, and not a river deposite; and I entertain no doubt, but that the land once was the bottom of the Chesapeake bay, and afterwards up-heaved by some ancient convulsion of nature, as, more recently, other regions have been known to be, so as to be raised above the waters which once covered it, and to which it owes its singular formation, and great fertility and value.

Contrary to the usual mode of describing soils, I shall begin with these at the *bottom*, or at least as low as the foundation is yet known. This is believed to be one entire and continuous body of what is here and elsewhere erroneously called marl; ancient sea-shells, broken down, disintegrated, or by their softness ready to become so; which bed is seldom more than six feet below the surface, frequently not three, and sometimes near enough to be cut into by the plough; and which reaches lower than any digging for wells has yet been carried. Wells, however, generally reach enough water within 6 or 8 feet, sometimes within four; and the deepest diggings heard of were in one well of sixteen, and another of twenty feet; and of these, for all but the upper three or four feet, the digging was in these shells, or marl. The earth on the marl is always wet with veins of spring-water, and generally it is sufficiently abundant to supply a well, dug any where as deep only as the marl, and sometimes before. There usually lies over the marl a reddish yellow layer of sand, having enough of clay to be adhesive, and which varies in depth from an inch, or less, to

more than a foot. Upon the authority of a good practical farmer, Mr Simcoe, who lately died, it was said that this yellow earth, as thrown out of the ditches, had been found to be a valuable fertilizer; and hence it was supposed by some, to be calcareous. But upon testing it, I found that it was not in the slightest degree calcareous; nor do I believe it can have any valuable effect as manure, unless it were desired to furnish iron, or sand, to the soil. It was probably mixed with the marl lying immediately below, and which also is very often thrown out in digging ditches of not more than 30 inches depth; and thus it might have become a manure by that admixture.

The low-ground consists of what is called gray land, black land, and a small amount of a third kind, called the chocolate-colored.

The gray land is a clay loam, of the color indicated by the name, close in texture, and lying on a very intractable clay sub-soil, which, when dug up from ditches, does not lose its barrenness by time and exposure. The gray land forms the larger proportion of the whole, and exclusively forms the points which run down to the rivers, made by their very crooked courses, or between their branches. Hence, in such places, this kind is also called "point-land." These points of gray land are a little the highest; and on them, and close to the margins of the rivers, are most of the mansion-houses of the proprietors situated. Before being cleared, this land was covered by a growth of large oaks; and though low and wet, was not often covered with water. The early and best product of such soil was not more than 20 to 25 bushels of corn to the acre. It is a better soil for wheat than for corn. Much of it is now reduced to a much poorer condition, by long-continued scourging tillage. But some has been much improved by manuring, and the better system of farming which is now getting into use; and many farmers say that this soil, when so improved, is more productive and valuable than the more celebrated black lands.

The black lands are interspersed on the surface among the gray in a very irregular manner, and of which there seems to be no sufficient explation, except in the supposition of the original formation of both which I shall offer, however wild and ridiculous such speculations may be considered. While the gray land seems to be exposed at the surface in the form of long, though low and wide points, narrow streaks or ridges, and circular prominences, all of which are but very little higher than the adjacent and interspersed bodies of black land, the latter seems to have such outlines as ponds of water might be supposed to have, if bounded, or separated, by the gray land. And such, I think, was the former condition of both. The gray land formed the entire surface, with such slight variations of level as had been caused by the different currents and eddy waters, when covered by the Chesapeake. When the highest parts were raised above the height of the tide, fresh water, from the springs and rains, filled the lower parts, rendering them shallow ponds, gradually becoming changed, by the growth, decay and deposite of vegetable matter, to swamps; and which now form the black lands, so celebrated both for their original and very durable fertility. According to these views, the original gray land, should be the sub-soil of all the black land; and such appeared to me to be the case, notwithstanding all the present existing differences of the two sub-soils. Both are stiff, tenacious, and very intractable clays; difficult to penetrate when dry, and difficult to clear from the digging implement, when wet. But while the sub-soil of the gray land, when thrown up, remains barren, that of the black land, though cutting like putty or pitch, when moist, and forming very hard clods when first dry, moulders down, after exposure, even though but to summer weather, and becomes finely pulverized, mellow, and fertile, so as not to be distinguishable from the black upper soil. The cause of this difference of the sub-soils, I infer to be this. All, as stated before, lie over a continuous bed of marl; but, according to the supposed formation, that under the black soil is of much the least thickness. It is, even now, penetrated by the craw-fish, (or cray-fish,) which sink their curious wells and dwellings from the surface of all the black soil to the marl below, and bring up the shelly earth, to form their buildings above the surface; and the annually renewed labors of millions of these little well-diggers, continued for ages, must have had no inconsiderable influence in rendering calcareous the black soil, and also its sub-soil, through which they pass. The craw-fish do not bore in the gray lands. But a still greater operation of this kind has been carried on by the growing trees; which, by their roots penetrating the marl below, drew up lime continually, and by their subsequent death and decay, deposited all the lime, thus incorporated in their substance, on the surface of the earth.

These geological speculations (if they may be dignified by that name,) may appear to some as foolish, and to others as idle and unnecessarily brought forward, even if true. But any plausible theory of the formation, and cause of the peculiar features, of this region, is not foreign or useless to an investigation of the nature of the soils; and this theory seems to me in perfect accordance with the now existing circumstances. This will be further seen in the following as well as the preceding parts of the description.

The soil of the black land, when moist, or just turned up by the plough, is as black as any can well be; and even when dry, is so much darker, as to be easily distinguished from the gray. It is mixed with a large proportion of vegetable matter, even when worn by exhausting cultivation for many years. From its being very favorable to the growth of white and red clover, melilot, and other products of calcareous soils, it is evident that much lime must have been drawn from the marl below, by the trees, or otherwise, and fixed in the soil. And this lime still remains in the soil, though it is not in the state of *carbonate* of lime. The soil is not generally calcareous; but is *neutral*, according to the doctrine of acid and neutral soils presented in the 'Essay on Calcareous Manures.' If any of the black soil has calcareous earth, exceeding the acid, and the vegetable matter, with which it combines, and therefore would show the presence of some carbonate of lime, it should be such as had been among the richest originally, and the most retentive of fertility under as long-continued and severe cultivation as any part has borne, and to which no manure had ever been given. From just such as this, I selected for trial, a specimen, at Warner

Hall, the farm of Colin Clarke, esq. The specimen was subjected to a very delicate and sure test, which gave evidence of the presence of an exceedingly minute proportion of carbonate of lime; but so small, that it was impossible to measure it, and certainly not equal to one grain in 10,000 of soil. This therefore, substantially, is a neutral soil. The gray has generally a sprinkling of sheep-sorrel; which proves sufficiently that the soil is actually, though but slightly, acid; and needs calcareous manure to remove that noxious quality, as well as for the other advantages, which the black soil might also derive, in a less degree.

Very little of this black land remains now in its natural state, in wood and almost under water, as all such was formerly. But at Warner Hall there is a large body (300 acres) both of black and gray soil in a state of nature, and which I examined carefully, and with peculiar interest, as furnishing the best indications of character. In this natural state, and at this time (May 12th,) and through winter and spring generally, the uncleared black land is truly what it is called, "swamp land." The soil is saturated and in many places covered by water, from rain, and it is troublesome to ride over the miry surface, and impossible to walk, except through soft mud and water. The larger growth is black-gum, of great size, white or sweet-gum, ash, sycamore, and other trees seldom found on high and dry lands. The papaw is very abundant, though generally of small size. When new, the black land is of the highest grade of fertility; and even under great defects of drainage, produced 50 bushels of corn to the acre. Under tillage, the soil becomes as finely pulverized and as light as can be in any case; and therefore it is not as well suited for wheat as for corn. After many years of scourging cultivation, and without manure, (for that was rarely given to any of this soil,) the black lands, thus abused, can yet produce 25 or 30 bushels of corn to the acre. I saw on the land of Major W. K. Perrin, on Ware river, a growth of very fair red clover, regularly and thickly set, on a field which had been for the ten previous years under the two-shift rotation of corn and wheat, and probably not rested from grain tillage, even one year, in the many that have passed since the land was first cleared.

The soil of the black land, though so light under tillage, is mostly a stiff and very tenacious clay loam when ploughed up, and while moist. Some however, as on parts of Whitemarsh, the farm of John Tabb, esq., is found much more sandy. The soil is very deep, say one to two feet; and it then changes to the stiff but open clay subsoil which has been already spoken of. Still lower, the clay is blue, close, and very heavy when dried, after being worked into a mass when wet. Still, like the upper clay, this also crumbles fine by exposure, and becomes good soil.

The clay shores of Mobjack bay, where left naked at low tide, seemed to my view to be not very unlike the clay soil of the gray land; and the shallows in the Chesapeake, stretching from the lower end of Gloucester, are composed of naked and solid marl, such as forms the lowest stratum of the low-grounds. This probably lies under all the adjacent shoals of the bay, and likewise under the marshes, which, though covered frequently by the tide, and always as wet as possible, are yet so firm that I rode briskly and easily across many acres without any danger of miring. In the firm parts of these marshes, shores, and still lower shoals, is presented another body of Gloucester gray land, which wants nothing but elevation, to be the same with such as is now distinguished by that name. But enough of uncertain speculation.

Of the "chocolate land" there is but little; and I saw none except that which is part of the farm of Jefferson Sinclair, esq., at the mouth of Ware, or rather on Mobjack bay. The marl there, under this chocolate land, is so near the surface as to be generally within reach of deep ploughing; and the common ditches of the farm sink so deeply into it, that from one-fourth to one-half of their banks is composed of a very rich marl. Thus, merely by ploughing, and by carting off the ditch banks as manure, the land is made more and more calcareous; and was probably so to a considerable degree before cultivation, as the rich marl is at so little depth below the surface. This marl, by its yellowish red color, seems to contain much iron; and to this, as well as its calcareous quality, is probably due the reddish-brown color of the soil, from which its name is taken, and also its remarkable productiveness. This kind is the most valuable land in Gloucester.

This land was, not many years ago, a shallow pond, covered with water-plants and gall-bushes, and was celebrated as a place of resort for wild ducks. This, as well as the greater part of the whole farm, is so low, that high tides flow up into all the ditches, or, at least, did so flow, until a bank was made and flood-gates erected, to exclude the tides. But though lower than any other arable part of the country, this land was decidedly the driest, when visited. The marl on which it lies appears to be an almost unmixed mass of finely broken fossil shells; and this very open stratum, though so little above the level of common tides, and though always wet within a foot or two of its top, yet serves, by its openness above, as a complete under-draining to the land.

Two specimens of this marl which I selected, as apparently presenting the average richness in calcareous matter, when analyzed, gave products of carbonate of lime, (or pure calcareous earth,) the one of 76 parts in the 100, and the other 72. The first was of the most usual appearance, consisting of very small, or broken and loose shells, mixed with either the oxide (or rust) of iron, or clay of that color. The last specimen was in parts tinged deeply with green, by a fine green clay with which it is mixed. The chocolate soil lying above this marl is every where mixed more or less with fine particles of shells, perceptible by the eye. A specimen selected from ploughed land, and among the best in productiveness, yielded 6 per cent. of carbonate of lime. This was more calcareous, to the eye, than many other parts, but less so than others. No marl had ever been carted there. But as very deep ploughing will almost every where bring up marl to mix with this soil, it is difficult to select an average specimen; and impossible to know whether the soil was partially, and to what extent, so mixed by nature, or by cultivation. Mr. Sinclair has made as much as 14 barrels of corn to the acre on some of this land. It produces clover finely; and part then had on it (after clover-fallow) the finest wheat which I saw in Gloucester.

Of other marls of the county of which I took

specimens for analyzing, the following were the several proportions of carbonate of lime found.

White marl, from beneath black low-ground soils, taken out of a ditch 2½ feet deep, on Warner Hall, the estate of Colin Clarke, esq., contained 58 per cent. of carbonate of lime.

Three specimens from the diggings on the high land of John Tabb, Esq., surrounding the court-house—

No. 1, yellow marl - - - 69 per cent.
No. 2, yellow - - - - 57 per cent.
No. 3, blue - - - - 36 per cent.

Two specimens from the high-land part of the farm of W. K. Perrin, Esq., on Ware river—

No. 1, at the bottom of the digging, 47 per cent.
No. 2, from the top, - - 52 per cent.

When compared with marls of 70 to 80 per cent., and even richer kinds, of which reports have been spread abroad, it may be that the poorer of these kinds may be thought too weak for use; and therefore the statement of their degree of strength may even discourage the working them. There is a general and very erroneous fastidiousness on this subject. Many are anxious to marl if they could be sure that their banks are rich enough; but would be reluctant to commence, and doubtful of the profit, with their marl, if its strength were supposed or proved to contain less carbonate of lime by 30 or 40 cent. than some other kinds. It is undeniable that such differences are very important; and that marl of 80 per cent. is worth per bushel twice as much as that of 40, and four times as much as that of 20 per cent., other circumstances being equal. Nevertheless, they who cannot use richer, may be well content with making proper applications of the poorest qualities. The facility of applying a very poor marl, may make it cheaper to give of it to the land a certain amount of calcareous matter, (the only object of the application,) than from a bed twice or thrice as rich. My own marls used during the first years of my practice, and through the first 400 acres covered, did not average, throughout the work, more than 38 per cent.; and in addition, and what is more important, the average difficulties caused by depth of the over-lying earth, the wetness of the marl, and the high hills and the distances over which it was generally drawn, were unusually great, and very far greater than any required in Gloucester; and that, nevertheless, and in spite of all the errors and losses caused by want of experience, and of any practical guide, these labors were more effective, and have resulted in a higher degree of continued improvement, and more net profit on the investment, than is known of any other prior improvements elsewhere, or of any made since, by other means than marling or liming. I have used, and in great quantities and with results entirely satisfactory, a body of marl which had barely 20 per cent. of calcareous earth, and the other remaining four-fifths of worthless sand. These statements, and the egotism, may be pardoned for the lesson which they convey, to all who hesitate to use marl because it is not richer than 30 or even 40 per cent.

The highest point of the ridge of high-land in Gloucester, is generally a loam of moderately close texture. The slopes are more sandy. All the high-land that came under my view, seemed to be of that defective natural constitution which makes marl necessary, and which will return the largest profits for its application. I saw only one farm where it had been applied generally, or to great extent, as well as to great advantage. This was Dr. Wm. C. Taliaferro's. But several other gentlemen, though later beginners, have also done much in marling on the high-lands.

It has been said that the variations of level, throughout the whole extent of low-ground, are scarcely distingushable by the eye; and not at all, except to close inspection. The view extends without interruption for some twenty miles over the low-ground; which, so far as the eye would indicate, is one perfectly level and unbroken surface. Though almost every farm has more or less of wood-land, the proportion is small, to the quantity of open and arable land; and without intercepting much of the circle of vision, or range of view, the woods add greatly to the peculiar and striking beauties of the landscape. I never had exhibited to my sight more beautiful scenery, than from several different points on the brow of the hill, or long ridge of high land, which forms the land boundary, and every where overlooks the low-grounds. Among these positions, are the mansion house on Whitemarsh, that of Col. Thomas Smith, near Ware river, and Zion Hill, a neat little church which overlooks the winding North river and the numerous farms on its borders. The wide extent of fertile or apparently fertile land, seems perfectly level, and the surface unbroken except by the waters of the rivers, which, seen in various turns, and between different bodies of wood, or other obstructions to the view, appear like so many detached lakes of clear and placid water. To a farmer's eye, the agricultural beauty still more heightens that of the landscape. The fields are generally divided by very neat fences, which, as well as the numerous ditches, are so placed as to make the dividing lines straight, and generally at right-angles; and thousands of acres of such regularly-shaped fields are spread before the observer in all the variety of naked or newly ploughed dark soil, and the different shades of green of the fields of wheat, barley, oats, clover, and natural grass on the pastures. The waters and the woods fill the remainder of the picture, which is further heighened in beauty by the numerous mansions and other buildings, on neighboring low-ground farms; and to the prospect there is no limit, save that fixed by the feebleness and imperfection of the power of seeing. From the elevated site of the Whitemarsh mansion, these general and uniform features of the low-ground scenery are exhibited to great advantage. But in addition, there is also an unusually large proportion of black soil, and of luxuriant crops, in the fore-ground of the landscape; and the waters of two of the arms of the Mobjack bay, the Severn on the right and the Ware on the left, are in full view, and the waters of the wider parts of these bays are seen spread out in the distance, and over the tops of the intervening trees, and the whole so separated by land and by woods, as to appear like many lakes, varying from very small to very large size. From the same point of view, vessels may also be seen sailing on the North river, though the water is too far distant to be visible. When seen soon after sunrise, or before sunset, and in the position to show the ruddy glow of the sun's reflected splendor, each of these seeming lakes deserves to be compared to a

"sheet of burnished gold," fully as much as Scott's Loch Katrine. There is another appearance of the sun-light on the water which was to me more novel, and therefore still more striking. Between 8 and 9 o'clock in the morning, when riding along the ridge of the high-land, I came in sight of the distant and wide waters of the Mobjack, or perhaps of the main Chesapeake beyond. These waters, thus seen over the tops of high woods, always presented, to the unaccustomed eye, the optical delusion of the water appearing full as high as the tops of the highest trees; and in addition, in this case, the water being directly beneath the sun's position, received from it no red or fiery reflection, but the white and dazzling brilliancy of snow, seen in bright sunshine.

There are other and great beauties of these winding and narrow sea-creeks or bays, which are improperly called rivers, and which misnomer serves to convey very false ideas of these waters. To me, and probably to most other inhabitants of lower Virginia, there are associated with a small tide-water river, the ideas of head-streams contributing irregularly, but largely, to the supply of always muddy water—muddy shores, and the margins bordered and deformed in many places by large miry marshes—and these visible characters inseparably connected with the stench of decaying vegetation, and the certain production of disease. But very different are the features of these arms of the Mobjack bay. Except the Ware, none of them receive but a very small supply of fresh water from springs, streams or rains. They are filled with refluent sea-water, as clear as crystal, and pure except for saltness. There is very little marsh on either, and on North river, none; which, by giving clean and firm shores every where, renders that river and its margins more beautiful than any other. The general level of the low-ground region is supposed to be not more than six feet above the height of common high tide—and generally less; and as there is no sensible decline to the water's edge, the waters seem to fill their broad basins to the brims. The very winding courses of these waters present continued changes of prospect, and yet almost always that of lakes. Though every one of the numerous mansions on the North river farms, as on the other rivers, is placed close to the water's edge, still the crookedness of the course serves to scatter them over a wide space, and prevents that uniformity of appearance that would be expected from such an arrangement. The waters of North river, especially, confined by such banks, are beautiful; whether seen in calm repose, or enough affected by the wind to crest the sea-green waves with white foam. It is, with all its accompaniments, a scene, and a condition of things, more like romance than real life; and to a writer of romance, I would especially recommend the North river of Gloucester to furnish both scenery and subject matter. But it is full time to return from this digression from my proper subject.

It is not unlikely that the uniform level of this region may appear too monotonous, and become wearisome, when the novelty is over; and also that this feature is the more pleasing to me, from another early association of ideas, which is not always correctly applied here. Very low and level land, wherever I have known it before, is also very rich land; and this idea gives the more of agricultural beauty to this extensive flat, because the fertility of the whole, as seen indistinctly in the distance, is raised by the imagination much higher than would be found real, upon closer inspection, and longer acquaintance.

It is not my purpose here to describe the farming in general, or any of the practices with particularity. For this, I had neither sufficient time, nor opportunity, stranger as I was to every thing in the county. A very slight sketch is all that will be attempted.

The rotation most in use on the low-grounds, is the three-shift; of 1st, corn, 2d wheat, barley, or oats, 3d, *rest*, as it is called, which is grazing, either on clover, or without. The two-shift rotation, which is simply that of the first two years of the other, and, of course, without any rest from an annual crop of some kind of grain, was formerly general, and is even now still pursued by many. None but excellently constituted soil could have so long borne so scourging a course as even the mildest of these two; especially as very little manure was used, until recently, except on a few farms. Five years ago, clover was sown but on a few spots, and to a very limited extent, though now it is on almost every farm, and usually covers a large part of the field which is third in the course of crops. In addition to this late and vital improvement, I was told by several farmers that the whole quantity of manure now used in one year, is tenfold greater than a very few years ago; and that a strong and effective impulse has certainly been given to the general improvement of agriculture in the whole county. This impulse, in part, was said to have been received from the contents of the Farmers' Register. Of the correctness of this supposition it was not for me to judge; and if otherwise, it would have been too gratifying, to be much questioned, or severely scrutinized.

Besides the manures furnished by the offal of crops, passed through the farm-yard, or stable, as elsewhere, the improving farmers of the low-grounds have found and have used, and are yet in the course of using, great and valuable supplies, in the ancient accumulations of oyster-shells and rich earth, &c. made on all old settlements, either by the present inhabitants, or the aborigines. In some few places, the Indian banks of oyster-shells still cover acres of their former towns, and would furnish much of calcareous as well as of enriching manure. But the more recent accumulations are those mostly used, and these also were large, as the removal had been long neglected. Of the great body of marl, lying under all the low-grounds, but little has been used as manure, and there is too little confidence, in general, in its profit on the low-grounds, to induce the application. Some farmers, however, are zealously engaged in marling the low-grounds, and already consider their outlay well repaid. Capt. Tabb, on North river, is as yet the most extensive marler of low-ground; and he thinks that whoever has enough leaves or woods-litter, to apply with or after marl, can make his farm as rich as he may desire.

Though I would strongly urge the marling of *all* the low-grounds, (unless any part be already sufficiently calcareous,) and would expect great profit therefrom, considering the uncommon ease and cheapness with which the manure could be applied, still, I do not expect from it any thing like such large increased products to the acre, or per

cent. on previous products, as is found on soils naturally poor, and of much less value than these. But much of this land could be marled so cheaply, that an increased clear product of only one bushel of wheat (at present prices) or 200 lbs. of clover-hay, would amount to near or quite 100 per cent. of annual and permanent profit on the investment. On the gray lands (unless marled from the black,) the expense would be greater, and likewise the product, as these lands evidently need marl to neutralize their acid quality, as well as to store up and fix putrescent matters. On the poor high-lands there are many farmers using marl; and what is the more gratifying, and the stronger evidence of the manifest profitable returns, I was told that it is mostly among the poorer class of farmers that these improvements are to be found. Marl is found in almost every ravine cutting through the high-land, and along the whole Chesapeake side of its steep slope. In the black low-grounds, the ordinary ditching, of two and a half feet depth, often reaches the marl, and sometimes it forms the bottom of a ditch for half a mile together. If all the ditches were deepened, the same operation would serve to drain the land better, of subterraneous spring water, (which operation is much needed.) and to furnish marl, in the cheapest manner, for all the adjacent ground. If there were any need to increase the already great facilities for water conveyance, level navigable canals, might be extended from any one river to another, or all the way from York river to the head of North river, by digging not more than from 6 to 10 and very rarely perhaps 14 feet, and the lower part would be in solid marl throughout; and, thus, if properly located, and on a general and uniform plan, the same excavations which would be profitably made for obtaining marl alone, would also furnish deep drains for the land, which would be very beneficial, and also might carry any desirable depth of tide water, and navigation, at the same time. I merely mention this as illustrating the remarkable natural facilities offered for these operations; and not to recommend their being thus combined. For though, even on such a combined plan, the marling here could be effected far cheaper than in most other places, where that is the sole object, yet it may be done here much cheaper still, by digging in the spots where the marl is nearest the surface, or nearest to the land on which it is to be applied. High as the stratum of marl lies, still it is beneath the surface and level of land naturally wet, and seldom sufficiently drained. Of course the marl is wet, and usually after being dug into, two or three feet, furnishes enough water for permanent wells. These difficulties are greatly and erroneously magnified by the imagination of those even who desire to use marl, or who have tried digging at "leisure times," (that is in winter, or wet weather, unfit for cultivating the soil,) and always without any proper plan for keeping water from impeding the work. It is always important, for saving labor, and for marling cheaply, and to any great extent, that wet diggings should be drained as effectually as the location admits; and, every where, that the marling should be carried on as a regular and continued work, throughout the year, or through all the best season of it. But no where would more advantage be gained by following these two rules than here; and by the neglect of both, in every case, great obstacles to the work have been created, and suffered to operate most injuriously. No general plan for excavating marl in such situations can be prescribed in advance of practice, and without some experience of the nature and circumstances of the bed; but I may venture to assert that the cost of pitting marl here would be reduced to half of that of any of the work already executed, by attending to the following general directions. First—to sink, from the intended pits, a ditch, to bring off the water, as low as an outlet can be well obtained; and that would generally be as low as the tide water. Secondly, to keep the area of excavation as well drained as possible. And thirdly, to keep at work regularly throughout the year, or to suspend operations only during the depth of winter, if that season should be attended with much increased difficulty. Without thus making it a regular and continuous job of work, I may venture to foretel that no man will do much at marling on the Gloucester low-grounds. The most that has yet been done, except on a very few farms, is in carting off the ditch-banks, to level them, as well as for manuring; and as many parts of these are mixed largely with marl, the earth gives calcareous, as well as enriching manure. In any such mixture, however, the share of benefit due to the marl alone cannot be exactly known; and it is therefore seldom fully appreciated. But, whether it is owing to this chance-made and little-valued admixture of marl, or otherwise, all persons are satisfied of the profit of using, as manure, rich banks of ditches, scrapings around old dwellings, (which here are always calcareous, with oyster-shells as well as ashes); and these manures have been used and are still in the course of application, to great extent. Many of these applications are, in fact, *marling*, or adding calcareous earth to the soil; though that, the most important action of the manure, is never duly appreciated, and sometimes perhaps not even known by the persons deriving the benefit.

Wheat is considered here a more uncertain crop than in general, and especially on the black lands. Indeed, one of the best cultivators and most successful and judicious farmers, the deceased Philip Tabb, pronounced that these black lands would not do for wheat-culture; and his opinions had so much weight, that it was one of the causes why barley was made, for a long time, almost exclusively the small-grain crop after corn. All this region is colder in spring than on the tide waters of James river, owing to the great exposure to easterly winds, and their prevalence. I suspect a still greater cause of injury to the wheat is the want of draining, notwithstanding all the labor and care used for that object; and the land being always, in winter and spring, injured by excess of water, either on the surface, from rains, or by sucking up moisture from the veins of springs below, and which may be reached by shallow digging every where. Both of these evils are perfectly within the farmer's power to remove; and with their removal, I think that much of the supposed unfitness of the black lands for wheat will disappear.

Next to corn, barley had here long been the most important market crop; and I have never heard of its being successfully raised elsewhere in Virginia, or even a single trial succeeding well enough to induce repetition, except on the similar black lands of Back river, where also it has been

an important culture. Hence I infer that a soil of peculiar and uncommon constitution is necessary for barley, and that the peculiar quality required is a proportion of lime very unusual in the natural soils of Virginia.

But, some years ago, barley also became here a very precarious crop. The most promising crops were sometimes speedily and almost totally destroyed by myriads of caterpillars; and, in one season, by some other unexplained fatality, all the fields of barley failed. These disasters caused the sowing of this grain to be greatly reduced; and, though since increasing, the culture in general still remains but small. Another objection to this crop is the uncertainty of the market, and the great fluctuations of price. Barley is used in this country only for making malt liquors, and the demand is therefore necessarily small.

Corn is the great crop of Gloucester, and is always a sure product. To favor the cultivation of corn, it would appear, their mode of tillage is especially directed, and to great loss and inconvenience in the other crops of broad-cast grain and clover. The fields are universally kept in narrow beds, laid off generally precisely five feet in width, but sometimes an inch or two wider, and sometimes as little as four feet ten inches. The general width, however, is five feet. One object of these narrow beds is to save labor in tillage; as four furrows, thrown by a two-horse plough, serve to reverse these beds, by lapping the first two slices and covering over eighteen inches width, unbroken, in the old alley, or water-furrow; and four other furrows, with a one-horse plough, when the corn is well advanced in growth, will sweep out and cover the whole interval between the rows, throwing the slice towards, and up to the plants. But even if labor is saved in corn-tillage, (of which I am not convinced,) it is greatly increased by having such narrow beds for broad-cast crops of grain or grass. The sowing, and getting in the seed, must be much more troublesome, always imperfect compared to flat tillage, and the reaping or mowing as objectionable in both these respects. But so much do habit and long usage lessen our estimate of difficulties and losses, that none of the farmers with whom I talked thought these objections to narrow beds of much importance. My objections, however, are not wholly theoretical, but sufficiently confirmed also by the practice of several years, and on entire fields of a large farm.

But the most important object designed to be gained by this plan of narrow beds, is the better drainage of a flat surface; and it is an opinion here universally established, that by wide beds that object could not be so well attained. To prove this, the fact is adduced, that many persons tried throwing two beds into one (of 10 feet) when sowing wheat; and that the plan was found bad for drainage, by there remaining a sink in the middle of the new bed; and bad for the subsequent tillage of corn, when these wide beds were to be brought back to narrow ones. I admit fully these objections to this particular departure from the general plan, which is far from such as I would approve; but nevertheless hold to my objections to narrow bed culture, not only for the tillage considered alone, but as a means for surface-draining. As I consider the plan which I would propose to substitute as an important improvement, and of which I have practically and satisfactorily proved the value on my own lands, and as it seems peculiarly suited to the Gloucester low-grounds, I will state my views at length, and presume—ignorant and inexperienced as I am as to these lands—to offer advice as to their management, to those who have been long and well acquainted with them. Of course, such opinions and such advice will be considered of very little value, and deserving of but little notice.

Compared to the proper drainage of the surface, the mode of tillage is of but minor importance. So much more of the facility of cultivation and of the amount of product, would depend upon the drainage than upon any other part of the management, that I dismiss any objections to narrow beds on the score of waste of labor, or waste of product; and shall consider the shape given to the surface solely in connexion with its most important object, the relieving the surface of superfluous moisture.

It should be remembered that the surface of these low-grounds receives no rain-water except that which falls directly on them; and that all of that must be either absorbed by the deep soil, or the surplus part slowly conveyed to the ditches, by water-furrows and shallow cross-drains. No water can otherwise run off, because the surface has no descent; and none can sink, as on higher and more sandy and open soils, because the sub-soil is a compact and tough clay, impervious to water. Of course, the object of the cultivator should be so to slope the surface as in the best manner to effect and to hasten the departure of all the excess of rain-water, beyond the wants of the soil. This is said, by the Gloucester farmers, to be done by narrow beds; and I maintain that it would be much more effectually and cheaply done by very wide beds, if properly made and preserved.

In theory the narrow beds promise well; and I have noticed that their advocates always refer to them in a state of perfection, which is rarely found in practice; and which, if greatly departed from, seems to defeat their object. If the narrow beds are separated by open, clean water-furrows, (called alleys in Gloucester,) well graduated, and having unbroken, and therefore not very absorbent, bottoms, over which the water will pass to cross-drains and to ditches in the lower places—then there is in fact a small but open and effective ditch in every distance of five feet. But this perfect condition is seldom attained; and even if attained, by great care and pains, is lost, or greatly impaired, by every ploughing, or other tillage operation, when the field is in corn; and even by the growth of plants, (when they can be made to grow in the alleys), when under a broad-cast crop. When under a tillage crop, and the water-furrow is choked by ploughing or harrowing the beds, of course they will be cleaned out soon after. But if a heavy rain falls before that operation, the surface of the land is as little fitted to discharge superfluous water, as if no beds or alleys had been made. Indeed, in such cases, or when the beddding is badly executed, the water-furrows are no better than indentations which serve, not to discharge, but to receive and retain the excess of water.

But it is yielding too much to suppose any thing like the perfection of execution, at any time, described above, even when most perfect. Such a state is obviously impossible. In what is considered land well bedded and water-furrowed, the

bottom of every furrow is but a succession of long shallow depressions, separated by slight bars of ground, more elevated naturally, or left so by more shallow cutting of the plough in such spots. Of course, all these depressions, when filled by rain, are so many little ponds; and even if not more than an inch deep, the water must stand in every one until evaporated, or slowly sucked up by the already over-gorged soil. As the soil of the black land is generally too deep to be cut through by the ploughing, and is moreover very absorbent, the disappearance of this water there must be more generally caused by absorption than by evaporation. The slight and numerous inequalities of depth, referred to, are such as it is impossible to avoid leaving on the most level land, in ploughing, and of which the depressions are too small and too numerous to be cut through and relieved by cross-drains, or grips, as they are called elsewhere. These cross-drains are now always made, and serve well, wherever there is any considerable natural depression (say even as little as 4 inches) stretching across the direction of the beds. But serviceable and well constructed as these may be, the number necessary to be made, and their being filled, and requiring opening, at every tillage process, are also serious difficulties. And when these cross-drains are caught, not properly opened, by heavy rain, the evil is so much the greater than in the case of alleys, because one of these grips is designed to receive, and discharge into ditches, the water from hundreds of beds. The grips are, and for convenience ought to be, but very little lower than the bottoms of the water-furrows; and therefore both are necessarily bottomed on the absorbent soil of the black land.

When there is more careless and slovenly ploughing, and surface-draining, all these objections are still greater. The beds under wheat have frequently an average though unequal width of a foot or more in the water-furrow, on which the plants have been entirely killed by standing water; the less, though still highly injurious, effects of which must have extended higher upon such narrow and necessarily low beds. On some land, the wheat plants stood throughout the furrows, and this was made a claim of merit in the system, and in the execution. But if the plants of wheat live in so low a place, through winter, as on the bottoms of the water-furrows, I infer either that the plants, though living, cannot be healthy and productive; or if productive, that the soil was, in fact, so dry as not to need a drain every five feet to keep it well drained. Upon the best executed bedding, surely the bottoms of the water-furrows must be more exposed to wet than would be the whole surface, if there were no water-furrows.

But, even on the plan of narrow beds, I do not consider it better that the whole alley should bear plants. I would prefer the entire absence of them on a narrow, but clean furrow, as best for both drainage and for immediate product.

Now for the proposed substitute.

Supposing the land to be already laid off accurately in five-feet beds, five of these should be thrown together, by a deep ploughing, so as to form beds of twenty-five feet. It should be done by beginning at, and lapping two furrow-slices on the crown of the middle bed of the five, and then continuing to plough "in-and-in" until the plough at some place touches the water-furrow in which the new one is to be left. Then the plough should stop, at the end of that furrow, and begin upon the intended crown of the next wide bed, and continue it in like manner until the line for a new water-furrow is again touched somewhere. The narrow strip left between the two new beds should then be ploughed deeply, "out-and-out," throwing the slices alternately to each bed, and closing with a furrow which will be easily sunk full six inches lower than the old alley in the same place. Still the new bed would be badly shaped, owing to the four closed old water-furrows not being enough filled; and moreover it would be generally too low, compared to its width. Hence a second ploughing would be necessary immediately, or before any heavy rain. The first furrows of this should be run as before, except that instead of meeting on the crowns of the beds, (where there would be already a list sufficiently high,) a width of about two feet on the crowns might be omitted, and the first slices thrown no closer than to the edges of that strip. When the plough again reaches the water-furrow, it will have, by the gathering of so wide a bed, more room than before, to sink the new water-furrow, deeper, and also to clean it out well. These two ploughings, if well executed, and followed by a harrowing, would leave the surface of the bed tolerably well graduated, and gently sloping from the crown to shoulder; and the water-furrows at least 9 inches deeper than the old ones; and not only deeper, but generally sunk into the clay sub-soil, so as to convey the water off through a close and impervious pipe, as it may be called, instead of over open and loose absorbent soil. The mere consideration of the difference between the wide and the narrow beds, and the five small and shallow draining furrows of the former, and the broad and deep one of the latter, would show that the latter is better for drainage. Every such water-furrow is, in fact, a ditch, and a capacious and excellent one; but which is made and kept open by the plough, and furnishes no impediment to the crossing of animals, or of half-loaded carts. The fully loaded should be drawn along the bed, and would have a far better road than on narrow beds.

Grips or cross-drains would still be needed, but not in half the present number; because the now deeper water-furrows would keep any shallow standing water fully nine inches lower than formerly, and therefore less, if at all hurtful. But wherever necessary to be made, the grips should now be increased in depth, of course, in proportion to the new water-furrows, from which they are to draw the excess of water.

The wide beds are never to be reversed entirely; that is, the water-furrow must always be kept in the same place, and made as deep, and as clean, as ploughing can effect. For one or two crops, or ploughings, after the first, it may be best to throw the slices still towards the crown of the bed, so as to raise it higher. But if so continued, the bed would soon become too high, and the top either too round, or angular. This is easy to prevent. If it is desired to depress the crown of the bed, but yet to raise the sides midway between the crowns and water-furrows, let the middle and higher strips of the bed be ploughed "out-and-out," like a "land" in common flush ploughing, and without caring to preserve any precise outlines.

When the middles of two beds are thus ploughed down, or reversed, then the portion between them will be also broken up, throwing the slices "out-and-out" and of course up the sides of the bed, until closing with the last furrow accurately in the water-furrow. If the whole surface of the bed should have been so raised by previous ploughing, as to require being flattened, then the first two or three furrows should be run in the water-furrow, so as merely to deepen and clean it, throwing the slices neatly up to the shoulder, or edge of the bed. This being done in two adjacent water-furrows, the intermediate space should be cloven, or reversed; that is, ploughed downward. In this case the lists, or meeting slices, will be at the shoulders of the beds, and the operation leaves the beds in beautiful form, and good order. In any mode of cleaving down the bed, the closing and deepest furrow is always on the crown, which being before the highest, prevents there being made too much depression. After running the harrow over, the mark of that furrow will scarcely be visible.

The corn-rows on these wide beds, are easily and accurately laid off. The ploughman will first run a furrow, as near as his eye will fix, at 3 feet from the middle of the water-furrow; and then another, in the same manner, on the other side of the bed. The intervening space he then splits, by a row on the middle of the bed, and then again splits the two side spaces. This will give 5 corn-rows on each bed, with equal intervals, except the water-furrow interval being about a foot wider than the others. This will be ploughed open by mould-board ploughs, and thus left deep and clean, at the last working; but this at other times, and the bed intervals always, may be tilled merely by cultivators, or any similarly operating implements, and with as little labor as on land tended entirely level. When small grain is sown, the seedsman takes a bed at two casts, and throws from the water-furrow always, unless he sows twice over the same ground. Thus, though two feet width in the middle of the water-furrow may be considered as given up, and lost to tillage, and direct product, still there is much saving of labor, of seed, and of crop, wasted before in five times as many water-furrows.

This plan I substituted for narrow beds, and to my entire satisfaction, on low-grounds entirely different from, and far less suitable, than those of Gloucester. The greater and peculiar fitness of the latter is found in the circumstances of the absence of all flooding, and surface spring-water, the great depth of soil, and the impervious texture of the sub-soil.

The plan of narrow beds being here universal, and also the opinion that such are absolutely necessary to keep the land as much as possible free of water, the fields furnished no subjects for comparison; except between land on which the operation was executed either well, or very imperfectly. In the latter case, as before observed, the water-furrows are made receptacles and retainers of water, instead of dischargers; and the land is as much affected and injured by water, though not so regularly, as if it had been ploughed flush, and designed for flat culture. But even where the beds had been well shaped, and the water-furrows as well opened into cross-grips as can be hoped for in extended culture, wherever the sub-soil was retentive, and no plainly visible descent in the direction of the beds, and whether on land in wheat, or in corn, there were numerous evidences to the eye that the land had suffered by the water in the water-furrows or alleys. It cannot be otherwise on such level land, and under the generally existing circumstances. On such land, and so shaped by ploughing, the water-furrows, which receive so much water, must necessarily be too wet through winter, and until late in the spring. But these excessively wet streaks, each say a foot wide, are not more than nine inches below the perpendicular height of the crowns of the beds, and only two feet distant from them, and generally in the same absorbent soil. Under these circumstances, it is obvious, that if any water be in the water-furrows, and whether standing, or flowing off very slowly, the absorbent higher soil of the beds must be sucking up the moisture like a sponge, and must be thereby injuriously affected. While such a contest is going on, in the spring, between the water in the water-furrows, and the drying sun and air, much of the land prepared for corn has a superficially dry streak, varying from one to three feet in width on the middle of each bed, and which may be perhaps mellow and in fine order; while the sides of every bed, as well as the water-furrows, are still too wet to plough, or for any operation of seeding or tillage. Of course nothing can be done on such narrow streaks, until all the space is dry enough. A similar effect in unequal drying is found also on the wide beds. But there, instead of impeding, it forwards the opportunities for preparation and tillage. In winter, or early spring, the middle of the bed, to the width of from eight to twenty feet, may be abundantly dry for ploughing, while the lower parts are still much too wet; and the water, perhaps, standing in every water-furrrow. On these middles, the ploughing may go on with nearly as much convenience as in the ploughing of alternate lands on a flat surface; and thus half the field, or more, may be ploughed well, before returning to take the lower parts as they become dry. On this plan, it is essential that the water-furrows be kept clean, deep, and always in their original positions; but so this is done, the remainder of the bed may be ploughed flush, and in any manner that such and other circumstances may render most convenient or desirable. The extreme outlets of the water-furrows into ditches, being few in number (compared to narrow bedding,) and never changed, may be deeply and neatly shaped by the spade; and will seldom need to be repaired; and therefore are always ready to operate. The reversing of narrow beds destroys the old outlets, and requires immediately a very troublesome operation in opening new ones by hand, which is to be repeated every time the field is broken up; and until the new outlets are so made, the new ploughing has served to make the surface basin-shaped, and suited to retain, instead of venting, all the surplus water that may fall on it.

The system of draining in the low-grounds of Gloucester is entirely of the surface, and almost entirely to guard against rain-water. Every acre needs surface-draining, and is, for that purpose, thrown into beds and water-furrows, and whenever necessary, with shallow cross-grips, and deeper ditches for continually flowing, though very feebly supplied streams. But no inundating streams

affect the land, and no superficial springs have to be intercepted, except along the foot of the hills, at the junction of the high and low land. Being so much secured from both these causes of wetness, which are such great evils elsewhere, the farmers here, who do not border on the highlands, have directed their operations exclusively to draining the surface, and seem to consider nothing else as wanting. My objections to their plan have been urged at length, in the foregoing remarks on bedding. But even if their plan of surface-draining were perfect, and though the land is in a great degree secured from subterraneous and spring water, still I think that the land would be much benefited by deeper ditching. Though there is scarcely a spring which rises to, and flows off at the surface, still, as before stated, wells every where reach veins of springs at only a few feet below the surface; the depths of which vary from 2½ feet on the shallowest black, to 6, or at most 8 feet, on the deepest gray land. As the water, and a continued supply, may thus be found in every spot, it may be inferred that it is under the whole of the land. If the whole of the few feet of the earth, lying above the marl and the springs, were of an absorbent and pervious texture, there is no question but that the underground spring water, having no low and sufficient outlets, would be continually rising by the absorption of the soil, and would affect the surface injuriously. This rising of the water may be, and probably is, generally prevented here by the almost universal substratum of close and tenacious clay, which serves as a shield against the subterraneous water. But still, the absorption must be injurious, wherever the sub-soil is at all open, in fissures, or otherwise; and this I infer must be the case to some extent under most of the black soil. It is therefore probable that if the ditches, which are now seldom more than 2½ feet deep, were sunk considerably deeper, they would cut into, and discharge at the lower level, much spring water, which now, though never visible, and its operation not even suspected, is slowly but continually rising into and injuring the land, and still more the crops. These remarks apply to ditches on all the low-grounds. But besides, along the base of the hill where ditches are now always kept to cut off the little spring water that is visible, it is likely that deeper ditches would serve to cut off a much greater quantity, which now flows in a level so low as not to be visible, or even suspected. Experiment could easily settle these questionable points.

My examination of the Gloucester lands, and a small part of Matthews, was commenced on my arrival on the 11th of May, and ended five days afterwards. Even this short time, which at best permitted but a superficial view, was made shorter, (in more senses than one,) by the urgent claims made on my time by the hospitable attentions of gentlemen to whom before I was personally unknown, and whose kind invitations and attentions there was no resisting. The hospitality of Gloucester has long been celebrated; and, as generally in former times through lower Virginia, is carried to an injurious and blameable extent; which however is now a fault in but few other places, because both the land and the owners are now too much impoverished to continue the exercise of old Virginian hospitality. That Gloucester is yet able to do so, and that so many of the land-holders are still rich, or in easy circumstances, is only to be accounted for by the general fertility of the land which they have to cultivate. But though, to a visiter and stranger, there is every thing to be gratified with, in the refined manners and social habits which prevail here, and though I had especial reason to be thankful for the kindest and most flattering attentions, still these were so many impediments to my progress through the county, and still greater to my leaving it. The Gloucester people welcome the coming, and feast the staying, but do not "speed the parting guest." Being fore-warned of these kindly-meant restraints, I tried at first to beg off from dinner parties and visits upon appointment: but with so little effect, that I soon found it necessary to cease opposition, and was scarcely a free agent during my stay in the county. But in other respects, every aid was given to my movements and observations, when permitted to be so engaged; and I was carried either through, or close by and in full view of, nearly all the farms from Severn to North river.

The only part of the low-ground district which I did not see, was the part called Guinea, near the lower part of York river. This is very low land; and in that respect very like that of Matthews. It is settled exclusively by a number of poor people, who live more by fishing than by tillage. The land, though rich, and firm, is so low as to be covered by the highest gust-tides, and therefore is the less safe, and productive. I saw such very low lands, which had sometimes been swept over, and the growing crops destroyed, by salt water, on the farms of J. Sinclair, esq. in Gloucester, and of Wm. H. Roy, esq. in Matthews. On the lowest of these lands at all fit for tillage, cotton is the safest crop. Salt is evidently a specific manure for that plant; as lime is for wheat, and gypsum for clover; and of course, must always be furnished, to bring the crop to the greatest perfection.

On North river lies what was the Toddsbury estate, formerly belonging to the late Philip Tabb, who was celebrated as one of the best managers and cultivators in lower Virginia, and one of the earliest who had any pretension to be considered a very good farmer. The estate is now cut up into a number of different properties, and the general condition, taken together, has fallen far below its former neat order and productive state. But the beauty of the old mansion and its location, are still striking, even among so many adjacent beautiful places, in better repair, or of more modern construction. The half of the estate owned by Capt. Tabb, a son of the former proprietor, is however in progress to a much higher state of improvement, by his use of marl, with which his father never even made an experiment, though it is on the land in great quantity, and of very rich quality. This is one of the most striking proofs of the universal ignorance among the best, as well as the worst farmers, not many years ago, of the value of this manure, and of the natural constitution, and the wants of soils, on which that value depends. But even the total neglect of marl by Mr. Tabb is not such strong evidence of this ignorance, as the contemptuous manner in which it is spoken of by another still more distinguished farmer and improver, John Taylor of Caroline; who gives his opinion in his 'Arator,' that if marl

were worth using as manure, it could hardly be supposed that the Creator would have buried it so deeply in the earth. However, even this curious *à priori* argument against the value of the marl, has no ground to rest on in Gloucester.

From what I could hear, the high and well deserved reputation of Philip Tabb as a farmer, was founded upon his uncommon forecast, and excellent judgment, as a crop raiser, and his neat, admirable, and successful execution in cultivation, and in the management of whatever he undertook; and not upon his improvement of the fertility of the soil; although he did much, for his time, in applying putrescent manures. Upon soil so productive and so durable as his, good drainage, good cultivation, and general judicious and provident arrangement and management, were all that were necessary to render his farming profitable, and to maintain, and even for a long time to increase, the producing power of his land. But his farming, and his views, would not have served to make poor land rich, nor to have maintained an increased production on a soil less durable than that of his fine farm.

There was another former resident and cultivator of Gloucester, of whom I tried in vain to collect some information. This was Clayton, the learned botanical cultivator and author. Some remains of his garden were still visible a few years ago.

The seat of Warner Taliaferro, esq., is one of the most beautiful situations (where all are beautiful,) on North river. Like all the others, the surface of the grounds around the houses does not appear to be more than four feet higher than the adjacent water, at ordinary high tide; and as far as the sight can stretch over the lands of Matthews county, on the opposite side of the river, there is no greater elevation. The neighborhood here, (and it is so in a high degree throughout the county,) is delightful. Mr. Taliaferro told me that the houses of twelve of his neighbors, all resident proprietors of farms, were within three miles of his own; and I believe that every one is within a hundred yards, or less, of the edge of navigable water. The farms of this neighborhood were long ago estimated by old Mr. Philip Tabb as worth £10 the acre, ($33.33,) and that price has been generally maintained. Under peculiar circumstances, some have been sold for not half that price. Half the Elmington tract, 500 acres, without a house, or any thing but the land, was bought two or three years ago by Warner Taliaferro, esq. at $30 the acre, in cash, and at private sale. This may be therefore deemed to be the fair price of land alone.

A few minutes' passage, in a beautiful sailing boat, carried us across from the last-mentioned residence to that of Wm. H. Roy, esq. in Matthews. This farm, and the adjoining one, belonging to Dr. Tabb, were made the limit of my excursion. But so uniformly low and level are the lands of Matthews, that the small space which I saw, furnished, as I was told, a fair and sufficient specimen of the natural features of almost the whole county. But not so as to improvement and product; for both of which, these two farms stand much higher than the county in general, These are principally corn farms; as is the case through the whole county, as wheat is considered comparatively unproductive. But this is not caused by the too great sandiness of the soil, nor by wetness. The soil is a loam of medium texture, and though lying so low, is drier than most of the somewhat higher lands of Gloucester. The lands of Matthews were originally covered by a fine growth of white oak-trees, which would be sufficient to prove that the soil is not too light for good wheat. Until the woods were mostly cleared, the people were more engaged in cutting timber for sale, and in ship-building, than in cultivation; but recently, as the former pursuits have been necessarily abandoned, farming has greatly improved, in manner and in product.

Mr. Roy's farm has been improved, from a former very poor state, to a present product of corn varying in different fields from 5 to 7 bbls. per acre. Of course, I infer that the soil was originally good and productive, however much impoverished afterwards. The marl stratum extends also under his land; but is there reduced to a thickness of only about 18 inches, so that its digging can scarcely be profitable. The great improvement made on this farm is owing to the very large quantities of farm-yard and other putrescent manures made and applied; and which now extend over much the greater part of the field for corn in a three-shift rotation. Leaves from pine woods, in quantity, as well as all the offal of the crops, are used as litter; and through all summer, as well as winter, for littering standing cattle and hog-pens. No waste or other evil is found, as I had feared, from too rapid fermentation during summer.

I was surprised to find that the old-fashioned three several hand-hoeings, (or weedings, as called,) of corn, were still approved and practised on Mr. Roy's farm. But as I hope to receive from his own pen a more particular account of his farming, I shall present no more of my own hasty and imperfect observations.

Looking from the shore near Mr. Roy's house towards the Chesapeake, there is nothing but water and sky to bound the prospect; as it is a straight course through the capes of Virginia on to the ocean. It was a clear and bright morning, with a gentle wind from the east, which is the state of weather favorable to the optical illusion called "looming," and which I soon witnessed in a remarkable degree. Before suspecting the effect produced, or thinking of it, though not entirely inexperienced, I saw, towards the sea, at such apparent distance as to be not distinct except in shade and in outlines, a very high and large object, nearly square in form. Had I not known that no such thing existed, I should have guessed it to be a castle, or some other enormously large dark building, at more than 20 miles distance; and, as the nearest to such an appearance that any real object could present, I supposed it to be really a thick cluster of very tall pines, on some low island, or point, made very conspicuous at so great a distance by being seen against the clear sky beyond. Upon asking what the object was, I was told that it was a "ship's-head bunch," which is a little brush fastened down by a few low stakes, and which is made as a baiting place for angling for that kind of fish. The actual height above the water was not three feet, and the distance to the bunch was not exceeding three miles. The deception of the sight was not removed, and scarcely lessened, by being informed of the true

size and distance; though doubtless those who are accustomed to the phenomenon, learn to judge much better than strangers, and therefore cannot be so much deceived. The cause of the deception is the peculiar state of the atmosphere, which makes a near object appear to be very distant; and as the angle, from the eye of the observer formed by lines to the opposite outlines of the object, continues to be determined by its true distance, the supposed size is just what the extension of those lines would inclose, when at the supposed great distance of the object. As we rode along, another equally large and equally deceptious object came in view. It was nothing larger than a "blind," made for baiting and shooting wild-ducks.

The roads in Matthews are the best in the world. This is owing to the almost perfect level of the surface, the absence of all streams, or other water, and to the firm, yet sufficiently open texture of the soil. Every road has good ditches on each side, which serve not only to prevent water affecting it, but also furnish earth to raise slightly the middle of the road.

The whole county of Matthews is so well furnished with tide-water rivers, and inlets, that it is believed that not a farmer in the county is more than three miles from navigable water, and most of them not one mile. Yet with all this, the county is remarkably exempt from the bilious diseases which are supposed to belong to the low country, and especially to the low borders of tide-water. The explanation is found in this fact—and it would be worth millions of property, and thousands of lives, to the country in general, if properly applied—that there is not one mill-pond in the county. One pond-mill only is on the dividing line between Gloucester and Matthews, which, as usual, secures its annual snug little harvest of disease and death; but beyond its influence, there exists that state of health, and its accompaniments of physical power, energy, and capacity for enjoyment, so as to prove clearly to any reasonable and thinking people, that not one mill-pond (of the usual variable height of water,) should be suffered to remain in all the lower and middle parts of Virginia. But the subject is too copious to treat here, and too important to be neglected; and therefore I will present these facts and my commentary thereon at another time. I will merely observe here that the uncommon exemption from autumnal diseases which are the fruit of malaria, on the low-grounds of Gloucester, in which respect that region comes next to Matthews, and from mill-ponds, the sources of these diseases, is a blessing which alone gives value to their fertile soil, productive and convenient waters, and refined and delightful society. Tide-mills and wind-mills are used in Matthews; and also, but to a less extent, in Gloucester; as most of the low-ground proprietors there are also not far distant from some pond-mill on the highlands, of which the owner risks poisoning his own family, and certainly brings disease or death to some of his neighbors, to gain a few hundred bushels of toll-corn, and that at an expense often exceeding its value. However, I cannot blame mill-owners for availing of the profit conferred on them by law, by infecting and killing their neighbors, (when it is indeed a profit,)—nor would I propose, as a general measure, to deprive them of any such existing advantage, except for full pecuniary, or other sufficient compensation, to be made in return. But I *do* blame the legislative body, which permits the continuance and increase of these enormous and wide-spread evils—and also the blind and besotted carelessness and contentment of the people, who suffer the heaviest of these inflictions, and who will neither learn the cause, nor seek for a remedy. To this subject I will return—and again and again, while there remains any hope of awakening proper action.

From each of the rivers of Gloucester, there is a vessel which runs every week, to and from Norfolk; and there is one also which goes as regularly to and from Baltimore. These packets belong to a number of the farmers of the neighborhood, and are intended, and effect the object, to carry their products to market, and bring back their purchased commodities, in the most convenient and cheap manner. The captain of the vessel is not only the carrier of the articles, but the general agent and salesman of all the shippers: and in this manner the trouble and expense of a Gloucester farmer, in sending any surplus products to market, are not as great as if he lived only a mile or two from the town to which they are sent. This is another great source of convenience and profit to this region so favored in its position; and conduces to the economizing and selling of many small surplus products, which would otherwise be wasted.

The productive value of the land in the Gloucester low-grounds, and there being almost none which is not fit for tillage, when cleared and drained, have caused clearings to be very general; and the scarcity of wood, both for fuel and fencing, is one of the greatest inconveniences suffered by the farmers. Pit-coal is already in regular use as fuel in some houses on North river. For fencing, chestnut, which fortunately was a plentiful growth of the high-lands, has been recently the main reliance for the low-ground farms, even at 7 or 8 miles distance by land-carriage, and the timber purchased at a high price. As rails of this timber are almost secure from rotting, when not in contact with the earth, these costly fences are still cheap improvements. But the chestnut timber is now very scarce, and can no longer be counted on as a sufficient source of supply. Ditches and banks, for which the land is so admirably adapted, will probably hereafter be made to serve for inclosures; and in aid of this important object, deep and wide ditches will have an important value, in addition to the several others already mentioned.

All the low-ground farmers are now suffering greatly by the depredations of cut-worms and bud-worms, or wire-worms, on the young corn. Some have been compelled to plough up, and plant again, many acres of their fields; and the land not so treated, in many cases, requires to have two-thirds of the places replanted; and the loss, to the future product, as well as in present labor, is enormous, this spring, throughout the low-grounds. The great number of these worms, I should have supposed, might be sufficiently accounted for in the usual practice of breaking up the land for corn, late in winter, or in spring. On clover-sod, especially, so treated, elsewhere, great injury from worms would be counted on. But here, there must be some other cause still more favoring their depredations; as I was told of parts of fields having been ploughed very early in win-

ter, and on which, notwithstanding, the corn is as much injured as on much later ploughing. This has been an uncommonly cold and backward spring, and these lands are always kept colder in spring, as before stated, by the prevailing easterly winds. Until the 17th of May, the last day of my stay in the county, there was not one in which fires were not necessary for comfort. The cold, by retarding the growth of young corn, keeps it longer at the state in which the worms prey on and destroy the plants; and hence, the peculiar injury sustained this spring, and indeed, every spring, compared to warmer lands. But though the cold directly produced by the exposure to easterly winds, is an evil which cannot be avoided, still the ravages of insects would be doubtless much lessened by earlier ploughing, and still more by the more effectual drainage of the land. This last would not only permit the land to be ploughed earlier, and in better condition, but probably would lessen the coldness of the air, by avoiding the evaporation of so much excess of moisture as is now in the soil. The effect of evaporation in producing cold is a well known chemical fact; and there is probably more evaporation from one acre of ploughed and moist land, than from ten times the space of water. Thus, good drainage would serve not only to increase the productiveness of the soil, directly, but also indirectly, by forwarding and improving the ploughing, raising the temperature of the air, and by both means, helping to restrain the annual ravages of noxious insects.

One considerable off-set to the numerous advantages and delights of a residence on the low-grounds, is the bad quality of the drinking water. It was to me, however, less objectionable than I would have expected; though my sense of taste is not sufficiently acute to render me a proper judge of the quality of water. The wells almost always reach water in the marl, from which the foreign flavor is communicated. In the very few cases in which water is reached by wells before touching the bed of marl, it is said that it is very good. If, by boring, and putting down closely connected pipes, water should be drawn from beneath the bed of marl, (which has not yet been pierced through,) I think it very probable that it would be found pure and excellent. The water which percolates through marl, and supplies wells sunk therein, is bad in every known locality. On a very high and hilly farm, my residence some years ago, which was under-laid by marl throughout, the many springs, within convenient distance of the house, all furnished bad water. A well was commenced, though with but little expectation of obtaining different and better water, as these springs were nearly all around; and still less hope remained, as no water was found before penetrating the marl. Luckily this bed did not furnish so much water as to prevent continuing to dig, and getting quite through the marl to a soft sand below, from which rose an abundant supply of water, as pure and as cold as any known east of the falls of our rivers. The water rose to and stood at the height of 13 feet above the level where it was tapped. This one known result as well as theoretical opinions, would encourage me were I a resident on these low-grounds, to bore for pure water through the marl, if it should not prove to be too deep.

A young lady who had spent much of her childhood in this part of the country, once told me that the ice-houses were the most ornamental buildings in Gloucester; and though, for want of explanation, I could not imagine a ground for this opinion, I readily admitted its force as soon as the subjects came under my own view. As water lies so near the surface, and the soil is too close to permit water to sink through it, it is obvious that ice-houses cannot be made in pits, below the surface, as usual in the higher country. Hence, they are necessarily constructed on and above the surface of the ground. One plan of construction is general. A circular brick wall forms the body of the building, which of course is a regular cylinder, surmounted by a roof, which is, in shape, a flattened cone, the base of which is so wide as to form eaves projecting unusually far without the body of house. A mound of earth, circular at the base, regularly sloping as it rises, is thrown up all around and against the body, and conceals it to within two or three feet of the eaves of the roof. The mound of earth becomes covered with green turf. The summit of the conical roof is surmounted, in some cases, by a spire, in others by a ball, or small cupola. Altogether, in plan, proportions, and neat execution, these ice-houses are very pleasing to the eye, and add much to the beauty of the grounds around every mansion on the low-grounds.

[TO BE CONTINUED.]

LAW OF NEW-YORK IN REGARD TO TRESPASSING STOCK AND DIVISION FENCES.

To the Editor of the Farmers' Register.

* * * *

I have a friend who lives in the western part of the state of New York, now on a visit to me here, and in conversing with him on agricultural and other subjects, I have derived many useful facts—one of them I will detail to you, because it is of striking utility in my view, and on a subject upon which you have long interested yourself.

He informs me, that in the state of New York, the laws require every farmer to have such enclosures as will keep his own stock in—if he has none, he needs no enclosure, except on public highways. If then the stock of our neighbor encroaches on another, the one encroached on sends them to the nearest pound-master of the township, (and there are several in each,) who pounds them, and notifies the public of the fact, describing them, that the owner may come forward and claim them. The person trespassed upon then calls together three respectable, disinterested neighbors, who assess the amount of damage he has sustained by such intrusion, which the owner has to pay, together with all expenses of the pounder, &c. before the stock will be surrendered up to him; and in default of which, they are sold to make it good, and the surplus, if any, refunded to the owner.

This I consider an equitable and admirable regulation, and if adopted in this state, would save much trouble and discontent among neighbors. He also informs me of another equally just and necessary regulation. In all cases of *division fences* between neighbors, *each party* is *bound* to share

equally the expense of such an enclosure as is usual in the vicinity, and in case of default of either, the amount is recoverable before a magistrate.

This strikes me as a most wise provision; for occasionally you meet with a selfish, perverse man, who will contribute nothing to such an enclosure, although equally benefited, because he knows the other party would sooner erect the *entire* fence, than be, without it, liable to constant annoyance: and in such cases this provision would apply most happily.

I have ventured, my dear sir, to give you these ideas, thinking you might choose to embody them in some publication of your own on the subject, if thought worth it; but not to be published as coming from me.

[The condition required by our correspondent in his last sentence, is complied with by our withholding his signature.—ED. FAR. REG.]

For the Farmers' Register.

MONTHLY COMMERCIAL REPORT.

Markets have undergone little variation this month. Tobacco continues in good demand at $4 to $11 per 100 lbs., including all sorts except fancy qualities for manufacturing. The quantity inspected greatly exceeds that of last year to same date, the price being an inducement to get it to market.

Cotton commands (in Petersburg) 8½ to 9½ cents, according to quality. The receipts at the various ports of shipment in the United States, are about 1,550,000 bales against 1,230,000 at same time last year. The demand for cotton goods in England being very dull, this excess of the raw material must cause prices to continue low for some time.

The growing crop of wheat is reported to look fine generally; but in some parts of the country, the insect called chinch-bug has attacked it and done considerable injury.

Internal exchanges are improving, but the difference between some places is still very great; as for instance, between New York and Natchez, 20 per cent., Mobile 12, New Orleans 8, Charleston 5, and Virginia 4. Bills on London are 10 per cent. premium in Richmond.

Since the resumption of specie payments in New York, there is little or no pressure on the money market, and stocks generally have advanced. The importations of specie have continued to a very large amount.

The last legislature of New York authorised the establishment of private banks to an unlimited extent. Those persons who engage in the business, are required to deposite with the comptroller of the state, the amount of capital on which they wish to operate, in such United States or state stocks bearing 5 per cent. interest, as he shall approve, and can receive from him an equal amount in bank notes properly countersigned, so that the issues of notes will be limited to the amount of security thus deposited, and made responsible for their redemption.

Should this system be found to work well, as is confidently believed it will, the example will doubtless be followed by other states, and it may introduce a system of banking less liable to abuse than that which now exists.

The facilities of communication on the main line of rail roads have been increased this month by the opening of one between Richmond and Petersburg, and by the completion of the bridge over the Roanoke at Gaston, and of a portion of the rail road south of that place. X.

May 23, 1838.

Table of Contents of Farmers' Register, No. 3, Vol. VI.

ORIGINAL COMMUNICATIONS.

	Page
Advantage of obtaining seed wheat from colder climates. Benefit of marl and gypsum on sweet potatoes,	129
Perpetual fertility of certain soils,	130
Liming and marling in Matthews county,	142
Marling in Queen Ann's county, Md.,	144
The morals of manuring,	151
Deep ploughing, &c.,	164
Baden corn. Marl beds of South Carolina,	173
On the rotation for grain farms,	177
Remarks on the soils and agriculture of Gloucester county,	178
Law of New-York in regard to trespassing stock and division fences,	191
Monthly commercial report,	192

SELECTIONS.

	Page
Phosphorescent plants,	129
Rail-roads and steam-boats,	131
East-India caoutchouc	132
Origin of coal	132
Remarkable clearness of the air, a precursor of rain,	132
Beer,	132
Enamelled hardware,	133
On the causes which produce double flowers in plants,	134
Harvesting of corn,	135
Organization and functions of animals and plants compared,	136
Catastrophe in a mine,	138
Plants growing under glass,	139
Lime as manure,	140
Report of Netherby farm, Cumberland, England,	144
Relation of soils to manures,	152
Use of fish manure in England,	152
The price of rents, and of the tenant's "good-will" in Ireland,	154
Manures for wheat,	155
Taming wild horses,	158
Reaping machine,	159
General account of the tobacco trade of the United States,	160
Jauffret's new manure,	165
Treatise on bone-manure,	165
On the cultivation of small farms,	167
Route of the Michigan and Illinois canal,	170
Culture of onions,	173
Beavers in Surry county,	174
Loss of species of plants,	174
Silk-worms fed on rice,	174
Completion of removing the great raft on Red river,	174
Age and size of trees,	175